THREE ESSAYS ON INTERNATIONAL EQUITY RETURNS AND VALUATION RATIOS

by Ji Youn An

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Daouk,Hazem (Minor Member)

THREE ESSAYS ON INTERNATIONAL EQUITY RETURNS AND VALUATION RATIOS

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Ji Youn An

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THREE ESSAYS ON INTERNATIONAL EQUITY RETURNS AND VALUATION RATIOS

Ji Youn An, Ph. D.

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This dissertation explores the importance of firm valuation ratios (or stock price multiples) in predicting returns in international markets. This characteristic has been documented by literature as the value premium. In Chapter 2, "Warranted Multiples and Future Returns" joint with Sanjeev Bhojraj and David Ng, we look into the U.S. stock market and examine whether adjusted stock multiples can lead to higher predictability in stock returns. We adjust stock multiples by common economic factors and find that the adjusted price multiples can explain future returns better than unadjusted price multiples. In Chapter 3, "Country, Industry and Idiosyncratic Components in Valuation Ratios" joint with Sanjeev Bhojraj and David Ng, we examine the importance of country, industry and firm-idiosyncratic components in firm valuation ratios with a sample from 33 countries. We find that firm valuation ratios are largely affected by country membership. However, we confirm that firm-idiosyncratic component in a firm valuation ratio leads the returns predictability, i.e. higher level of value premium. In Chapter 4, "Can the Long-Run Risks Explain the International Value Premium? Evidence Using Last Century Data", I examine where the value premium is coming from. I explore in depth whether the long-run risks model, a recently introduced asset pricing model, can explain the value premium in 17 developed countries.

BIOGRAPHICAL SKETCH

Ji Youn An has interests in Financial Economics, International Economics, and Empirical Asset Pricing. Her three papers, “Does Long-Run Risk Model Explain International Value Premium: Evidence from Using Last Century of Data”, “Country, Industry and Idiosyncratic Components in Valuation Ratios” with Sanjeev Bhojraj and David Ng and “Warranted Multiples and Future Returns” with Sanjeev Bhojraj and David Ng, focuse on one of financial market anomaly, the existence of the value premium, with international financial market perspective. She has actively developed her research topic in two great academic places during her Ph.D program: Cornell University and University of Pennsylvania. She had begun her graduate program at Cornell in 2003 as a Ph.D student in Regional Science, department of City and Regional Planning. However, after fining passion in Economics, she has pursued her Ph.D program in Economics since January 2006. From July 2009 to May 2010, she was an exchange Ph.D student at the department of Finance, the Wharton School at University of Pennsylvania.

She was a consultant at Cornell Institute for Social and Economic Research from June 2005 to June 2008 and research assistants for Professor Aija Leiponen, Professor Nir Yehuda, and Professor David Ng from September 2005 to May 2010. Before her graduate program at Cornell, she worked for two years in real estate investment and advisory institutes and earned her Bachelor and Master degree in Urban Planning and Engineering at Yonsei University.

To Jaeuk

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CHAPTER 1

INTRODUCTION

Stock price multiples are common factors in predicting returns across countries. For example, a strategy to long stocks with high Book-to-Market (BM) ratio and to short stocks with low BM ratio has provided positive returns on average in international markets. This characteristic has been documented by the literature as the value premium. In this dissertation, I explore the importance of price multiples in predicting returns internationally.

In Chapter 2 joint with Sanjeev Bhojraj and David Ng, using U.S. stock market data, we examine whether adjusted stock multiples can lead to higher returns predictability. We adjust price multiples by common economic factors and find that the adjusted price multiples can explain future returns better than unadjusted price multiples. Stocks with low adjusted multiples have higher one-to-three year ahead stock returns than stocks that have high adjusted multiples. This difference in returns is economically and statistically significant, and is still significant even after adjusting returns with Fama-French three factors or a momentum factor.

In Chapter 3 joint with Sanjeev Bhojraj and David Ng, we examine two valuation ratios, Book-to-Market and Earnings-to-Price ratios, across 33 countries. We find that compared to industry membership, country membership has significantly more impact on the two valuation ratios. The two valuation ratios are found to predict subsequent stock returns around the world, and we confirm that most of the predictability comes from idiosyncratic component of the two ratios. Evaluating how Book-to-Market and Earnings-to-Price ratios change over time, we find that the idiosyncratic and country components are the main drivers of the valuation ratios. However, the importance of country vs idiosyncratic proportion differs across countries. Such difference can be explained by country-level governance, market efficiency and capital openness and firm-level illiquidity and information uncertainty.

In Chapter 4, I study where the value premium is originated. I explore in depth whether the long-run risks model, a recent theoretical asset pricing model, can explain the value premium in 17 industrial with a sample starting from early 1900s to ending in 2008. I then examine whether these estimated long-run risk factors explain the value premium observed in these countries in recent decades. The long-run risks model produces positive implied value premiums in less than half markets through all three cases: perfect integration, perfect segmentation and partial integration. I conclude that the long-run consumption risk has little ability in explaining value premiums outside of the U.S.

Finally, I conclude that fundamental firm risk factors and country risk factors explain cross-sectional differences in price multiples and those risk factors are related to stock return predictability of price multiples, especially Book-to-Market ratio. Under the recent theoretical framework, long-run risks explain the value premium. The model has built a theoretical explanation and has provided positive empirical evidence regarding international value premium. However, the extent to which the model replicates the realized value premium is a small portion. Given a short sample period of international return data and econometric analysis requiring long sample of returns, it is a limited success to directly present that value premium is related to long-run risks internationally. In my future research, I plan to overcome the issue by focusing on whether long-run risks model can explain international price multiples.

CHAPTER 2

WARRANTED MULTIPLES AND FUTURE RETURNS

(Joint with Sanjeev Bhojraj and David Ng)

1. Introduction

Accounting-based market multiples are a widely used technique in equity valuation. These multiples are commonly used in several settings including pricing of initial public offerings (IPOs), analysts' reports and recommendations as well as in investment bankers' fairness opinions (e.g., DeAngelo and DeAngelo (1990)).

Multiples are also extensively used by the asset management community to generate investment ideas. The use of multiples in trading and investment strategies is consistent with prior work which finds that multiples are useful in predicting future returns. For example, Fama and French (1992) show that firms with high book-to-market ratios earn higher subsequent returns than firms with low book-to-market ratios. One explanation for this finding is that firms with lower multiples are riskier since they include firms that are mispriced (i.e., undervalued firms) and firms in distress (i.e., riskier firms). Similarly, firms with high multiples could include firms that are mispriced (i.e., overvalued firms) and fairly valued firms. In this paper we apply the "warranted multiple" methodology developed in Bhojraj and Lee (2002) (henceforth, B&L (2002)) to generate multiples that are adjusted for differences in fundamentals and examine whether these adjusted multiples yield greater predictability in returns.

It is well-known that valuation ratios are driven by different fundamental drivers like profitability, risk and growth. This can cause firms to have lower (higher) valuation multiple simply because of their bad (good) fundamentals rather than a mispricing. Firms that have low multiples which are attributable to poor fundamentals are less likely to enjoy excess returns over the high multiple firms. We provide a better alternative to comparing different firms by creating a multiple in excess of the multiple warranted by its fundamental value drivers. Utilizing recent advances in valuation theory in Bhojraj and Lee (2002), we document that such an approach will generate excess returns beyond that of the existing risk factors.

Bhojraj and Lee (2002) suggest a "warranted multiple" approach to identifying comparable firms, which is more objective and based on systematic variations in the observed multiples in cross-section over large samples.[1] While their focus is on identifying peer firms, we focus on the predictability of future returns after the warranted multiples are taken into account.[2] As Sloan (2002) in his discussion of B&L (2002) points out, 'in order to see if their predicted multiples do a good job of identifying situations where current prices and valuation multiples are temporarily incorrect, they should stratify firms based on the difference between the predicted multiple and the actual multiple.' We examine this issue in detail in this paper by examining the relation between the spread between actual and warranted multiples and future returns.

We expand the set of multiples examined in B&L (2002) to include Enterprise Value-to-Sales (EVS), Price-to-Book (PB), Price-to-Earnings (PE) and Price-to-2-year ahead Forecast Earnings (PE2). We find that firms with high actual multiples relative to warranted multiples underperform firms with low actual multiples relative to

[1] One can think of the warranted multiple as a synthetic comparable. Warranted multiples for each firm are determined by incorporating the effect of cross-sectional variations in firm growth, profitability, and cost-of-capital. Comparable firms are those with warranted multiples closest to the target firm. However, instead of looking at other firms based on warranted multiples to identify comparables, the warranted multiple itself can be viewed as a synthetic comparable to the firm since it represents the multiple that a firm deserves based on its fundamentals and the weights that the market places on those fundamentals. The warranted multiple can be viewed as reflecting the implied or fundamental value of the firm.

2 B&L (2002) test the choice of comparables based on the warranted multiple approach by examining their ability to predict future (one- to three-year-ahead) firm multiples. This testing mechanism is useful in establishing the stability of the multiples relation and establishing the value of this approach to picking comparable firms. However, as they acknowledge, forecasting future multiples is not equivalent to forecasting future prices or returns.

warranted multiples. The underperformance in the first year ranges between 0.6% and 7.0% and strengthens in year 2. The underperformance is both statistically and economically significant. Further, the underperformance is robust to adjustments for firm characteristics including size and book-to-market and factor risk adjustments using the Fama-French three factors and a momentum factor.

This paper extends prior work that examines the use of fundamental ratios to identify mispricing firms within value and glamour subsets of stocks (e.g., Piotroski (2000), Mohanram (2005)). Piotroski (2000) finds that various financial ratios can be used to discriminate over- and under-priced firms within high and low book-to-market ratio quintiles. Our approach extends this insight in a warranted multiple framework. We first document the warranted price multiples for firms based on the industry- and firm-level characteristics and then see whether mispricing is more serious for firms that deviate more from the warranted multiples. Piotroski (2000) and Mohanram (2005) have more of a fundamental analysis focus by using fundamental information to parse out good and bad firms within a subset of firms. Rather than focusing on subsamples and then parsing out the mispriced firms, we look at the entire set of firms and make adjustments to the multiples themselves. We also adopt a valuation perspective and therefore, in addition to fundamental information, we adjust for differences in growth and risk. In carrying out these adjustments we use a regression based approach to determine the weights of each of the variables instead of using equal weights. Our results provide evidence about the validity of the excess multiples approach. The results suggest that the ad-hoc use of multiples can be improved upon by using a structured and disciplined approach. The excess multiples approach while retaining many of the advantages (particularly simplicity) of multiples based valuation approach, incorporates several of the advantages of the projected DCF method (particularly systematically incorporating the effect of risk and growth). The predictability of returns can be consistent with a mispricing story and a risk story. On the one hand, it could indicate temporary mispricing of fundamental information by the equity markets. The mispricing is corrected over the next three years, which is consistent with slow and incomplete adjustment to current information. On the other hand, it could also be that we have uncovered a value premium risk factor that is not captured by existing risk factors including Fama and French three factors or a momentum factor.

The rest of the paper is organized as follows. Section 2 discusses the procedures used to estimate warranted multiples, the data and the results of the estimation procedures. Section 3 deals with examining the relation between stock returns and warranted multiples and discusses additional robustness tests including risk controls. Section 4 summarizes the paper.

2. Estimating Warranted Multiples

In the tests that follow, we employ a multiple regression model to estimate the warranted EVS, PB, PE and PE2 ratios for each firm. The explanatory variables we use in the model are empirical proxies for the key elements that drive various multiples. We estimate monthly regressions along the lines specified in B&L (2002) to produce a "warranted multiple" (WEVS, WPB, WPE and WPE2) for each firm. These warranted multiples reflect the large sample relation between a firm's multiples and variables that should explain cross-sectional variations in the multiples. We use the difference between the actual and estimated multiples to examine predictability of future returns.

We use all firms in the intersection of (a) the merged COMPUSTAT industrial and research files, and (b) the I/B/E/S historical database of analyst earnings forecasts. In the event that more than one consensus forecast was made in any year, the most recent forecast is used. All balance sheet information used in the analysis is based on the most recent available quarter, while information relating to income statement items is based on the most recent trailing four quarters. In determining the most recent quarter, we provide a lag of two months between the quarter-end and the portfolio formation date for the first three quarters and a four month lag for the fourth quarter. [3] To facilitate estimation of a robust model, we drop firms with prices below $3 per share and market capitalization of less than fifty millions. We eliminate firms with negative book value (defined as common equity), and any firms with missing price or accounting data needed for the estimation regression.[4] We require that all firms belong in an industry (based on two-digit SIC codes) with at least five member firms. In addition, we eliminate firms in the top and bottom one percent of all firms ranked by EVS, PB, PE, PE2, PM, LEV, ROA, and ROE each year (these variables are defined below). The number of remaining firms in the sample ranges from 106 (in 1977) to 2,224 (in 2006).

We test investment portfolio strategies using stock returns from January 1977 to December 2006 that are downloaded from CRSP. Delisting returns biases are adjusted as in Tyler (1997) and Tyler and Warther (1999). Specifically, CRSP reports delisting returns and delisting reasons. We replace missing returns with CRSP delisting returns when the delisting event happens. For those firms with missing delisting returns, we follow Tyler (1997, 1999) in assuming a delisting returns of -30% in NYSE/AMEX and a delisting returns of -55% in Nasdaq. We obtain the Fama-French three factors (Mkt-r_f, HML, and SMB), Carhart's momentum factor (UMD),

[3] We have tried a specification with a four-month lag after interim quarter ends and a six-month lag after the fourth quarter ends. The main results in the paper remain the same.

[4] The two exceptions are research and development expense and long-term debt. Missing data in these two fields are assigned a value of zero.

and one-month T-bill rates from Kenneth R. French's website. Beta rankings of firms are downloaded from CRSP.

As in B&L (2002), we anchor our estimation procedure on specific industries. In other words, we use the mean industry market multiples as a starting point, and adjust for key firm-specific characteristics. Also, to the extent possible, we try to use similar variables for estimating EVS, PB, PE and PE2. Specifically, the estimation includes the following variables.

EVS_ind, PB_ind, PE_ind and PE2_ind: The harmonic mean of the enterprise-value-to-sales, price-to-book, price-earnings and price-to-2 year ahead earnings multiples for all the other firms with the same two-digit SIC code in that month. For example, for the June 1982 regression, this variable is the harmonic mean industry EVS as of June 1982 excluding the target firm. Enterprise value is defined as total market capitalization of equity, plus book value of long-term debt. These variables control for industry-wide factors, such as profit margins and growth rates, and we expect it to be positively correlated with current firm-specific multiples.

Profit Margin (PM): The profit margin is defined as the percentage of the firm's operating income divided by its sales. Sales is defined as the average of the trailing four quarters of net sales. Theory suggests this variable should be positively correlated with current year EVS and PB multiples.

Loss Profit Margin (LOSSPM): This variable is computed as PM multiplied by Dum, where Dum is 1 if PM is less than or equal to zero, and 0 otherwise. Used in conjunction with PM, this variable captures the differential effect of profit margins for loss firms. Prior studies (e.g., Hayn (1995)) show that prices (and returns) are less responsive to losses than to profits.

Growth Forecasts (LTG): We compute the growth forecast as the percentage increase of 2-year ahead forecasted earnings over that of the 1-year ahead forecasted earnings, i.e. (FE2/FE1 – 1) x 100%. Higher growth firms merit higher warranted multiples.

Book Leverage (LEG): This variable is computed as the percentage of the total long-term debt divided by the book value of common equity. In univariate tests, Gebhardt, Lee, and Swaminathan (2001) show that firms with higher leverage have higher implied costs-of-capital. However, controlling for market leverage, they find that book leverage is not significant in explaining implied cost-of-capital. We include this variable for completeness, in case it captures elements of cross-sectional risk not captured by the other variables.

Return on Assets (ROA): This variable is a firm's net income scaled by its total assets, in percentage terms. Net income is computed using the figures from the trailing four quarters. In our context, having already controlled for profit margins, this variable also serves as a control for a firm's asset turnover. We expect it to be positively correlated with the EVS ratio.

Return on Equity (ROE): This variable is net income scaled by the end of period common equity, in percentage terms. Again, net income is computed using the figures from the trailing four quarters. Conceptually, this variable should provide a better profitability proxy in the case of the PB ratio. We use this variable in place of ROA as an alternative measure of profitability when conducting the PB regression.

Total Research and Development Expenditures divided by Sales (RND_NS): Total Research and Development Expenditures (R&D) is computed using the figures from the trailing four quarters. Firms with higher R&D expenditures tend to have understated current profitability relative to future profitability. To the extent that this variable captures profitability growth beyond the consensus earnings forecast growth rate, we expect it to be positively correlated with the various multiples.

Table 2.1: Data and Preliminary Results

Panel A reports equal-weighted means of variables used in the annual estimation regressions. Market values are as of the end of each month. The last row represents the time-series average of variables. EVS, PB, PE, and PE2 are enterprise value to sales ratio, price to book ratio, price to earnings ratio, and price to forecasted two year ahead earnings ratio. The accounting variables are from the most recent fiscal quarter. PM is the profit margin, defined as the percentage of the firm's operating income divided by its sales. LTG is the growth forecast, i.e. the percentage increase of 2-year ahead forecasted earnings over that of the 1-year ahead forecasted earnings. LEV is the book leverage, computed as the percentage of the total long-term debt divided by the book value of common equity. ROA is the return on asset, which is a firm's net income scaled by its total assets. ROE is the return on equity, i.e. net income scaled by the end of period common equity. RND_NS is R&D divided by sales. RND_NS is zero until 1989 since R&D is only available from 1989. All variables are in terms of percentage. Panel B reports the results from the monthly estimation regressions. The dependent variables are one-month ahead valuation ratios. EVS_ind, PB_ind, PE_ind and PE2_ind are industry means. The time-series average coefficients are reported. The Newey-West autocorrelation corrected t-statistics are reported in parentheses. The adjusted R-square (Adj. R^2) and number of firms (# obs) are also reported. The last row reports the standard deviation of the valuation errors as the difference between actual price and warranted price divided by actual price

Panel A: Summary Statistics by Year

Year	No. Firms	EVS Mean	PB Mean	PE Mean	PE2 Mean	PM Mean	LTG Mean	LEV Mean	ROA Mean	ROE Mean	RND_NS Mean
1977	106	0.97	1.37	10.39	7.46	19.79	15.46	48.22	11.05	15.09	0.00
1978	234	1.13	1.27	9.80	7.45	21.67	11.02	68.14	10.19	15.33	0.00
1979	298	1.06	1.31	9.97	6.98	20.50	11.35	65.44	11.07	16.51	0.00
1980	333	1.08	1.47	10.73	7.52	18.94	16.38	65.14	10.70	15.85	0.00
1981	354	1.14	1.50	11.67	7.38	19.27	20.57	64.52	10.32	15.30	0.00
1982	443	1.11	1.46	11.26	7.64	18.72	23.90	64.88	10.05	14.70	0.00
1983	557	1.58	2.12	21.85	11.12	18.81	28.27	57.35	9.02	12.78	0.00
1984	652	1.39	1.84	18.78	9.16	19.65	24.31	51.94	10.70	14.61	0.00
1985	731	1.45	2.09	17.38	10.84	18.61	23.18	56.93	10.06	13.91	0.00
1986	793	1.65	2.47	22.16	13.10	18.08	23.47	60.57	9.12	12.42	0.00
1987	843	1.78	2.61	24.91	13.20	18.78	26.37	62.00	9.69	13.42	0.00
1988	868	1.49	2.19	21.23	10.93	19.10	20.42	62.68	11.00	15.62	0.00
1989	1,019	1.55	2.37	19.16	11.89	18.63	20.17	65.01	10.94	15.35	0.18
1990	1,019	1.48	2.18	18.48	11.26	18.81	22.08	67.80	10.31	14.73	1.70
1991	1,085	1.73	2.62	22.01	13.40	18.03	26.32	62.58	9.29	12.86	2.07
1992	1,197	1.83	2.75	28.74	14.40	17.86	26.83	57.02	8.60	11.18	2.22
1993	1,385	1.88	2.89	29.82	14.76	18.70	25.68	58.22	9.16	11.91	2.22
1994	1,656	1.80	2.66	24.41	13.72	19.90	25.61	60.85	9.49	12.78	2.09
1995	1,842	2.00	2.82	26.08	13.81	20.48	24.92	66.40	9.94	14.05	2.24
1996	2,003	2.29	3.16	29.35	15.31	20.43	24.83	64.75	9.48	13.51	3.42
1997	2,163	2.46	3.28	28.78	16.25	20.81	25.14	66.58	9.06	12.65	3.00
1998	2,198	2.45	3.35	27.83	16.39	20.43	25.27	74.77	8.74	12.07	2.86
1999	2,041	2.46	3.38	27.75	16.29	20.05	24.24	84.77	8.77	13.13	2.60
2000	1,855	3.17	3.67	41.58	18.41	21.08	24.20	83.86	9.69	14.70	2.84
2001	1,766	2.63	2.98	28.29	19.01	20.88	24.81	77.47	7.74	11.44	3.35
2002	1,716	2.60	2.70	30.15	17.50	21.29	26.33	75.36	6.05	8.93	3.16
2003	1,843	2.69	2.81	30.08	17.06	22.29	23.59	77.55	7.58	11.25	3.13
2004	1,984	3.06	3.12	34.16	17.76	22.86	23.05	71.45	8.78	12.64	3.33
2005	2,170	2.99	3.14	31.07	17.39	22.57	23.12	68.20	9.60	13.77	3.41
2006	2,224	3.05	3.34	30.31	17.70	22.21	22.18	66.52	9.88	14.05	3.28
Average	**1,246**	**1.93**	**2.50**	**23.27**	**13.17**	**19.97**	**22.77**	**65.90**	**9.54**	**13.55**	**1.57**

Table 2.1 (continued)

Panel B: Monthly Estimation Regression for Warranted Valuation Ratio

	EVS	PB	PE	PE2
Intercept	-0.650 (-26.00)	-1.068 (-16.51)	-4.213 (-4.85)	1.058 (4.19)
EVS_ind	0.283 (16.79)			
PB_ind		0.900 (22.72)		
PE_ind			1.089 (19.13)	
PE2_ind				1.017 (44.20)
PM	0.075 (52.00)	0.007 (9.59)		
LOSSPM	-0.111 (-5.70)	-0.155 (-3.27)		
LTG	0.013 (21.24)	0.015 (25.65)	0.471 (19.40)	0.034 (9.71)
LEV	0.001 (7.73)	0.001 (3.80)	-0.004 (-2.82)	-0.006 (-18.00)
ROA	0.012 (13.51)			
ROE		0.085 (40.93)		
RND_NS	0.062 (9.17)	0.040 (8.32)	0.735 (11.29)	0.267 (9.76)
Adj. R^2	0.532	0.390	0.181	0.226
N	435,163	435,163	348,364	348,364
SD of Valuation Errors	3.364	1.233	1.901	0.801

We do not include a measure of dividend payout since B&L (2002) find that it adds little to the explanatory power of the model. To summarize, our research design involves estimating a series of monthly cross-sectional regressions of the EVS, PB, PE or PE2 ratios on relevant explanatory variables. The estimated coefficients from previous months' regressions are used, in conjunction with each firm's current period information, to generate a prediction of the firm's current multiple. We refer to this prediction as a firm's "warranted multiple" (WEVS, WPB, WPE or WPE2).

Panel A of Table 2.1 provides yearly summary statistics of the variables used in estimating the warranted multiples. The average EVS for firms in the sample is 1.93. This is higher than the EVS in B&L (2002) and is attributable to the longer time-period and larger number of firms in our sample. The PB multiple in our sample is 2.50 which is comparable to the 2.26 multiple in B&L (2002) and higher than the 1.82 multiple in Liu, Nissim, and Thomas (2002). The PE2 multiple is 13.17 which is comparable to the 10.99 multiple in Liu et al. (2002). As expected, all four multiples display an increasing trend and peak in 2000 before declining in 2001. The average leverage of 65% is higher than that of 56% reported in B&L (2000). Similarly the ROE (13.55%) is comparable to the 12.39% reported in B&L (2002).

Panel B of Table 2.1 provides the means of the estimation coefficients for the various estimation regressions. Examination of the results yields two general findings. First, as expected, the industry multiple is the single biggest explanator of firm multiples. This is evidenced by the large and highly significant coefficients on the industry multiples. In addition, the results from this table indicate that a high proportion of cross-sectional variation in firm multiples is captured by the explanatory variables. The adjusted R-square on the estimation models varies between 53% for EVS and 18% for PE. Focusing on the EVS estimation results, we see that PM, LTG, ROA, and RND_NS are all positively associated with cross-sectional variation in EVS (p-value <0.01). This is consistent with our expectations and valuation theory. The coefficient on LOSSPM is negative and significant which is consistent with loss firms being treated differently from profit firms. Finally, the coefficient on LEV is positive, which is counter to expectations. However, this is consistent with B&L (2002) who find a similar effect.

The PB estimation results are similar to the EVS results. As in B&L (2002), ROE replaces ROA and has a positive and significant coefficient. The average R-square on the estimation regressions is 39% which suggests that the estimation model is effective in explaining cross-sectional variation on PB.

In estimating PE and PE2, we use a more restricted set of variables. In addition to industry mean multiples we use LTG, LEV, and RND_NS as explanators in the estimation model. As is evident from the valuation equation for PE discussed earlier, PE is a function of growth, risk and dividend payout. ROA, ROE and PM are already impounded in the calculation of earnings and therefore are not part of the valuation model for PE and PE2. As with EVS and PB, the industry average multiples are a significant explanator of firm multiples. In addition, LTG and RND_NS are significantly associated with both PE and PE2, which is consistent with expectations. LEV is negatively associated with PE and PE2, which is consistent with its role as a proxy for risk. The R-squares of the PE and PE2 estimation regressions are lower than that of either EVS or PB.

To examine the effectiveness of the regression specifications we examine the distribution of valuation errors that are generated by the estimation regressions. The valuation error is calculated as the estimated price minus actual price divided by the actual price. The standard deviations of the valuation errors are also provided in panel B of Table 2.1. The distributions suggest that the estimation specifications are most effective for the PE2 multiples and least effective for EVS multiples.

3. Warranted Multiples and Stock Returns

3.1 Warranted Multiples

Using information generated from the estimation regressions we determine the directional valuation error calculated as the difference between the actual multiple and the warranted multiple (DEVS, DPB, DPE, DPE2). Large positive values indicate overvaluation and large negative values indicate undervaluation. At the beginning of each month from January 1977 to December 2006, we form quintile portfolios of all available firms based on the multiple differences. *P1* is the *low difference* portfolio consisting of firms with lowest difference (most undervalued), *P5* is the *high difference* portfolio consisting of firms with the highest difference (most overvalued) and *P3* is the portfolio with average difference (fairly valued). We compute returns earned by these portfolios over the next four quarters and the subsequent two years. *K=1, 2, 3, or 4* refers to quarters one through four. Since the strategy uses overlapping monthly observations, the holding period returns are autocorrelated up to the degree of the overlap. The quarterly returns are autocorrelated up to two lags and the annual returns up to eleven lags. Therefore, the asymptotic Z-statistics (reported in parentheses) are computed using the Newey and West (1987) (henceforth simply Newey-West) autocorrelation correction with the appropriate lags.[5]

Table 2 reports the stock returns earned by firms in the various portfolios. Panel A presents results based on the DEVS measure. The results show that all four measures generate a statistically and economically significant effect on stock returns. The results in Panel A show that the stocks of the high DEVS portfolio (P5) underperform stocks of the low DEVS portfolio (P1) by 7.0% during the first year (Year 1) after portfolio formation. The underperformance persists in Years 2 and 3

[5] As a robustness test, we also carry out the analysis once a year, instead of using overlapping monthly observations. The results are qualitatively similar to the results using overlapping observations.

Table 2.2: Excess Valuation Ratios using Warranted Multiples and Stock Returns

This table summarizes results from investment portfolios strategies based on excess valuation ratios from January 1978 to December 2006. Excess valuation ratios are computed as valuation ratios minus warranted valuation ratios. Warranted valuation ratios are estimated based on the regressions in panel b of Table 2.1. The four excess valuation ratios are DEVS (based on excess EVS ratios), DPB (based on excess PB ratios), DPE (based on excess PE ratios), and DPE2 (based on excess PE2 ratios). Each month from January 1977 portfolios are formed based on the excess valuation ratios and divided into 5 equal-weighted portfolios. P1 represents portfolio consisting of firms with the lowest excess valuation ratios, while P5 represents firms with the highest ratios. Returns from these portfolios over the next four quarters and next four years are reported. The numbers in parentheses are the Newey-West autocorrelation corrected t-statistics. The number of lags used in the autocorrelation correction is 2 for quarterly returns and 11 for annual returns. Panels A, B, C, and D report stock returns earned based on DEVS, DPB, DPE, and DPE2 strategies.

Panel A: DEVS

Portfolio	Mean	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Year 1	Year 2	Year 3	Year 4
P1	-2.034	0.048	0.046	0.047	0.046	0.213	0.215	0.210	0.198
		(6.98)	(6.72)	(7.06)	(6.94)	(9.05)	(8.10)	(7.56)	(7.90)
P3	-0.857	0.040	0.041	0.041	0.041	0.180	0.179	0.173	0.171
		(5.79)	(6.08)	(6.09)	(6.19)	(8.39)	(8.03)	(7.39)	(7.07)
P5	1.048	0.026	0.030	0.030	0.029	0.143	0.143	0.156	0.159
		(3.50)	(4.11)	(4.11)	(4.02)	(5.69)	(6.25)	(6.32)	(6.19)
P1-P5		0.022	0.016	0.017	0.017	0.070	0.072	0.054	0.039
		(6.35)	(4.80)	(5.68)	(5.57)	(5.22)	(6.41)	(3.56)	(2.86)
Sharpe Ratio						0.631	0.799	0.465	0.402

Panel B: DPB

Portfolio	Mean	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Year 1	Year 2	Year 3	Year 4
P1	-2.691	0.046	0.043	0.042	0.042	0.194	0.200	0.201	0.190
		(6.05)	(5.76)	(5.69)	(5.78)	(8.09)	(7.62)	(6.99)	(6.86)
P3	-1.364	0.038	0.040	0.042	0.041	0.181	0.183	0.176	0.179
		(6.32)	(6.57)	(6.92)	(7.01)	(8.64)	(8.70)	(7.95)	(7.73)
P5	1.318	0.032	0.035	0.034	0.032	0.158	0.155	0.164	0.166
		(4.05)	(4.41)	(4.27)	(4.09)	(5.88)	(6.46)	(6.53)	(6.57)
P1-P5		0.014	0.008	0.008	0.010	0.036	0.045	0.038	0.023
		(4.15)	(2.49)	(2.44)	(3.65)	(2.37)	(4.49)	(3.14)	(2.28)
Sharpe Ratio						0.304	0.541	0.385	0.269

Panel C: DPE

Portfolio	Mean	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Year 1	Year 2	Year 3	Year 4
P1	-21.437	0.035	0.038	0.040	0.039	0.181	0.192	0.199	0.199
		(4.20)	(4.75)	(5.07)	(4.98)	(6.70)	(6.81)	(6.80)	(6.89)
P3	-4.522	0.041	0.042	0.041	0.042	0.182	0.179	0.175	0.172
		(6.82)	(6.94)	(6.85)	(7.14)	(8.69)	(8.68)	(8.14)	(7.72)
P5	27.701	0.039	0.039	0.037	0.034	0.175	0.168	0.171	0.167
		(4.92)	(4.98)	(4.79)	(4.51)	(6.73)	(6.90)	(6.78)	(6.78)
P1-P5		-0.004	0.000	0.003	0.006	0.006	0.024	0.028	0.032
		(-1.25)	(-0.12)	(1.01)	(2.28)	(0.62)	(2.56)	(2.72)	(3.24)
Sharpe Ratio						0.072	0.300	0.341	0.353

Panel D: DPE2

Portfolio	Mean	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Year 1	Year 2	Year 3	Year 4
P1	-4.642	0.039	0.039	0.041	0.043	0.190	0.197	0.201	0.196
		(4.84)	(4.99)	(5.29)	(5.63)	(7.44)	(7.35)	(7.10)	(7.25)
P3	0.391	0.041	0.042	0.043	0.041	0.184	0.181	0.173	0.174
		(6.79)	(6.94)	(7.19)	(7.03)	(8.92)	(8.99)	(7.96)	(7.69)
P5	9.752	0.033	0.036	0.035	0.032	0.161	0.159	0.167	0.164
		(4.28)	(4.66)	(4.53)	(4.24)	(5.98)	(6.17)	(6.43)	(6.67)
P1-P5		0.006	0.003	0.006	0.011	0.029	0.037	0.034	0.033
		(1.74)	(1.01)	(2.01)	(4.24)	(2.27)	(3.29)	(2.59)	(3.52)
Sharpe Ratio						0.279	0.441	0.348	0.390

with hedge returns of 7.2% and 5.4%. After year 2, the hedge returns become lower and less significant. The results also show that during the first year the underperformance is uniformly distributed over the four quarters after the portfolio formation date. In addition, the relation between the conditioning variable (DEVS) portfolios and future stock return is monotonic with the P1 portfolio enjoying the highest returns followed by the P3 and P5 portfolios.

Panels B, C and D present results based on the DPB, DPE and DPE2 measures, respectively. Conditioning on DPB, DPE and DPE2 yields hedge returns of 3.6%, 0.6% and 2.9% respectively in Year 1 following portfolio formation, though DPE is not statistically significant. The hedge returns from these portfolios become statistically and economically significant in Year 2.

The last row of each panel of Table 2.2 provides the Sharpe ratios of these strategies to give a sense of the risk-return tradeoff involved in these strategies. The Sharpe ratios corresponding to the profits of the zero-investment strategy (P5-P1) in Year 1 (based on non-overlapping calendar year returns) are 0.63, 0.30, 0.07 and 0.28 for strategies based on DEVS, DPB, DPE and DPE2 respectively.[6] The Sharpe ratios are stronger in the second year following portfolio formation for all four measures examined. The ratio goes up from 0.63 to 0.80 in panel A and shows similar increases in the other three panels.

It is possible that the market focuses on PE multiples in the determination of share prices. PE and PE2 generate the lowest future abnormal returns possibly because they capture the market's price-setting process. A different valuation ratio that is underweighted by the market when setting prices may in turn have a greater ability to predict future returns. In fact, our results suggest that EVS, which is

[6] The Sharpe ratio is the ratio of the average excess return divided by the standard deviation of excess return.

associated with the highest valuation errors in panel B of Table 2.1, generates the highest future abnormal returns.

3.2 Benchmarking Against Industry Multiples

The results in Table 2 show that sorts based on the difference between actual and warranted multiples are predictive of returns, which is suggestive of the actual multiples reverting to the warranted multiples. However, it is possible that the actual multiples are regressing towards an industry mean multiple and that warranted multiples add no information over the industry mean multiples. To examine this possibility, we carry out analysis similar to that in Table 2.2 with the only difference being the quintiles are formed based on the difference between the actual multiple and the industry mean multiple. The results of this analysis are provided in Table 2.3. In contrast to the findings in Table 2.2, the hedge returns in Table 2.3 are largely insignificant across all four panels and all years examined. This evidence reinforces the findings in Table 2.2 on the predictive value of the warranted multiples approach.[7]

3.3 Benchmarking Against Actual Multiples

The above industry-based analysis tests a benchmark where firms within the industry would revert to the industry multiple. However, it is possible that the entire industry could be over or under valued in which case the industry would revert along with all of its constituents. To evaluate this possibility we examine sorts that are based on the actual multiples. This is a simple value/glamour sort, where firms in overvalued industries would appear in the top quintile and firms in undervalued industries would appear in the bottom quintile. The results from this analysis are

[7] We also examine the hedge returns from sorts that are based on the valuation error based on warranted multiples. The results from these sorts (untabulated) are slightly stronger and largely consistent with the results in Tables 2.

Table 2.3: Excess Valuation Ratios using Industry Multiples and Stock Returns

This table summarizes the results from investment portfolio strategies based on valuation ratios in excess of industry valuation ratios from January 1978 to December 2006. Portfolios are formed on valuation ratios in excess of industry multiples. Industry multiples are computed as the monthly harmonic mean of the valuation multiples for firms within the same two-digit SIC code, excluding the target firm. The four excess valuation ratios are DEVS_ind (based on EVS), DPB_ind (based on PB), DPE_ind (based on PE), and DPE2_ind (based on PE2). Each month portfolios are formed based on the excess valuation ratios and divided into 5 equal-weighted portfolios. Please refer to Table 2 for portfolio definitions. Panels A, B, C, and D report stock returns earned based on DEVS_ind, DPB_ind, DPE_ind and DPE2_ind.

Panel A: DEVS_ind									
Portfolio	Mean	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Year 1	Year 2	Year 3	Year 4
P1	-0.648	0.048	0.046	0.045	0.045	0.206	0.202	0.202	0.199
		(6.92)	(6.71)	(6.80)	(6.87)	(9.04)	(8.91)	(8.26)	(8.32)
P3	0.187	0.036	0.038	0.040	0.039	0.172	0.172	0.164	0.172
		(5.45)	(5.64)	(6.00)	(5.76)	(7.86)	(8.01)	(7.31)	(7.29)
P5	3.136	0.031	0.033	0.032	0.030	0.151	0.155	0.168	0.163
		(4.20)	(4.43)	(4.44)	(4.31)	(5.76)	(5.99)	(6.23)	(6.06)
P1-P5		0.016	0.013	0.013	0.015	0.055	0.047	0.034	0.035
		(3.73)	(3.34)	(3.43)	(4.08)	(2.58)	(2.34)	(1.67)	(1.73)
Sharpe Ratio						0.387	0.347	0.237	0.271
Panel B: DPB_ind									
Portfolio	Mean	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Year 1	Year 2	Year 3	Year 4
P1	-0.853	0.043	0.041	0.042	0.041	0.189	0.198	0.199	0.191
		(5.79)	(5.49)	(5.75)	(5.63)	(7.79)	(7.63)	(7.15)	(7.40)
P3	0.135	0.036	0.040	0.041	0.041	0.178	0.181	0.174	0.177
		(6.16)	(6.71)	(6.99)	(6.89)	(8.60)	(8.27)	(8.19)	(8.11)
P5	3.579	0.038	0.037	0.035	0.033	0.167	0.157	0.168	0.165
		(4.52)	(4.57)	(4.37)	(4.16)	(5.86)	(6.21)	(6.43)	(6.08)
P1-P5		0.005	0.003	0.007	0.009	0.022	0.041	0.031	0.026
		(1.15)	(0.82)	(1.70)	(2.26)	(1.07)	(2.44)	(2.04)	(1.77)
Sharpe Ratio						0.156	0.366	0.281	0.257
Panel C: DPE_ind									
Portfolio	Mean	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Year 1	Year 2	Year 3	Year 4
P1	-6.814	0.038	0.040	0.040	0.040	0.181	0.185	0.189	0.194
		(5.14)	(5.38)	(5.52)	(5.62)	(7.64)	(7.74)	(7.26)	(7.74)
P3	0.643	0.039	0.042	0.041	0.040	0.181	0.181	0.172	0.171
		(6.78)	(7.16)	(7.10)	(6.88)	(8.91)	(8.65)	(8.23)	(7.65)
P5	41.466	0.037	0.037	0.036	0.032	0.171	0.168	0.180	0.180
		(4.25)	(4.25)	(4.19)	(3.90)	(5.57)	(5.92)	(6.21)	(6.14)
P1-P5		0.001	0.003	0.004	0.008	0.010	0.017	0.009	0.014
		(0.11)	(0.59)	(0.97)	(2.19)	(0.48)	(0.98)	(0.59)	(0.79)
Sharpe Ratio						0.070	0.145	0.077	0.118
Panel D: DPE2_ind									
Portfolio	Mean	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Year 1	Year 2	Year 3	Year 4
P1	-3.877	0.041	0.039	0.040	0.042	0.188	0.192	0.195	0.198
		(5.37)	(5.07)	(5.43)	(5.73)	(7.65)	(7.62)	(7.31)	(7.76)
P3	0.305	0.039	0.042	0.042	0.040	0.181	0.179	0.175	0.174
		(6.48)	(6.93)	(6.99)	(6.73)	(8.93)	(8.75)	(8.08)	(7.79)
P5	10.752	0.033	0.035	0.034	0.031	0.160	0.162	0.171	0.169
		(3.99)	(4.27)	(4.13)	(3.89)	(5.26)	(5.68)	(5.93)	(6.24)
P1-P5		0.008	0.003	0.006	0.011	0.028	0.029	0.024	0.029
		(1.73)	(0.71)	(1.36)	(2.91)	(1.23)	(1.62)	(1.40)	(2.10)
Sharpe Ratio						0.181	0.244	0.199	0.287

Table 2.4: Actual Valuation Ratios and Stock Returns

This table summarizes the results from investment portfolio strategies based on valuation ratios from January 1978 to December 2006. Portfolios are formed on the actual firm multiples. The four multiples are EVS, PB, PE, and PE2. Each month portfolios are formed based on the firm multiples and divided into 5 equal-weighted portfolios. Please refer to Table 2 for portfolio definitions. Panels A, B, C, and D report stock returns earned based on EVS, PB, PE and PE2.

Panel A: EVS									
Portfolio	Mean	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Year 1	Year 2	Year 3	Year 4
P1	0.461	0.045	0.044	0.044	0.043	0.199	0.194	0.199	0.197
		(5.78)	(5.69)	(5.79)	(5.71)	(7.53)	(7.41)	(7.36)	(6.99)
P3	1.367	0.038	0.041	0.041	0.040	0.181	0.179	0.172	0.168
		(5.70)	(6.00)	(6.25)	(5.97)	(8.16)	(8.15)	(7.33)	(7.07)
P5	4.721	0.030	0.032	0.032	0.030	0.149	0.154	0.169	0.165
		(4.35)	(4.66)	(4.73)	(4.57)	(6.06)	(6.51)	(6.63)	(6.50)
P1-P5		0.015	0.012	0.012	0.013	0.051	0.041	0.030	0.032
		(3.06)	(2.53)	(2.64)	(2.89)	(2.05)	(1.74)	(1.21)	(1.31)
Sharpe Ratio						0.306	0.262	0.177	0.202
Panel B: PB									
Portfolio	Mean	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Year 1	Year 2	Year 3	Year 4
P1	0.962	0.048	0.044	0.045	0.044	0.204	0.196	0.189	0.191
		(6.57)	(6.21)	(6.32)	(6.29)	(8.03)	(8.01)	(7.00)	(7.02)
P3	1.839	0.033	0.038	0.039	0.038	0.166	0.178	0.175	0.177
		(5.18)	(5.81)	(6.13)	(5.93)	(8.06)	(8.07)	(8.09)	(8.27)
P5	5.633	0.039	0.037	0.035	0.032	0.167	0.157	0.167	0.164
		(4.52)	(4.48)	(4.22)	(4.01)	(5.68)	(6.07)	(6.28)	(5.89)
P1-P5		0.009	0.007	0.010	0.012	0.037	0.039	0.022	0.027
		(1.41)	(1.18)	(1.79)	(2.25)	(1.29)	(1.71)	(1.01)	(1.21)
Sharpe Ratio						0.191	0.259	0.145	0.187
Panel C: PE									
Portfolio	Mean	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Year 1	Year 2	Year 3	Year 4
P1	8.509	0.045	0.044	0.043	0.044	0.199	0.190	0.189	0.194
		(6.41)	(6.38)	(6.21)	(6.39)	(7.88)	(7.37)	(6.60)	(6.75)
P3	15.439	0.035	0.037	0.039	0.040	0.169	0.181	0.176	0.170
		(5.54)	(5.83)	(6.21)	(6.33)	(8.69)	(9.03)	(9.06)	(8.28)
P5	58.812	0.037	0.037	0.036	0.031	0.170	0.168	0.175	0.177
		(4.13)	(4.12)	(4.15)	(3.72)	(5.31)	(5.64)	(5.90)	(5.75)
P1-P5		0.008	0.007	0.007	0.013	0.029	0.022	0.015	0.017
		(1.22)	(1.15)	(1.17)	(2.37)	(0.95)	(0.93)	(0.67)	(0.67)
Sharpe Ratio						0.138	0.135	0.091	0.103
Panel D: PE2									
	Mean	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Year 1	Year 2	Year 3	Year 4
P1	7.281	0.045	0.041	0.043	0.044	0.200	0.198	0.191	0.200
		(5.85)	(5.46)	(5.73)	(5.88)	(7.35)	(7.28)	(6.53)	(6.63)
P3	11.377	0.036	0.039	0.039	0.039	0.170	0.181	0.179	0.171
		(5.76)	(6.19)	(6.30)	(6.44)	(9.07)	(9.28)	(8.77)	(8.37)
P5	23.314	0.034	0.036	0.034	0.031	0.162	0.160	0.166	0.166
		(4.01)	(4.22)	(4.09)	(3.86)	(5.06)	(5.44)	(5.73)	(5.94)
P1-P5		0.011	0.006	0.009	0.013	0.038	0.038	0.025	0.035
		(1.75)	(0.89)	(1.44)	(2.37)	(1.20)	(1.49)	(1.04)	(1.66)
Sharpe Ratio						0.177	0.227	0.151	0.241

Table 2.5: Excess Valuation Ratios, Size and Book-to-Market Adjusted Stock Returns

This table summarizes results size and book-to-market adjusted stock returns based on excess valuation ratios from January 1978 to December 2006. For each firm, the adjusted return is calculated as the difference between the firm's returns and the mean returns for firms within the same 3 by 5 size and book-to-market buckets. Excess valuation ratios are computed as valuation ratios minus warranted valuation ratios. Warranted valuation ratios are estimated based on the regressions in Table 2.1 Panel B. The four excess valuation ratios are DEVS (based on excess EVS ratios). DPB (based on excess PB ratios), DPE (based on excess PE ratios), and DPE2 (based on excess PE2 ratios). Each month from portfolios are formed based on the excess valuation ratios and dividend into 5 equal-weighted portfolios. Please refer to Table 2 for portfolio definitions. Panels A, B, C, and D report stock returns earned based on DEVS, DPB, DPE and DPE2.

Panel A: DEVS

Portfolio	Mean	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Year 1	Year 2	Year 3	Year 4
P1	-2.034	0.008	0.005	0.007	0.005	0.028	0.032	0.029	0.019
		(4.86)	(3.31)	(4.06)	(3.05)	(2.94)	(2.94)	(2.61)	(1.86)
P3	-0.857	0.001	0.001	0.001	0.001	0.000	-0.003	-0.007	-0.005
		(0.67)	(0.49)	(0.57)	(1.08)	(-0.09)	(-0.39)	(-1.16)	(-0.97)
P5	1.048	-0.011	-0.007	-0.007	-0.007	-0.027	-0.025	-0.015	-0.014
		(-6.95)	(-4.57)	(-4.66)	(-5.18)	(-4.47)	(-4.48)	(-2.02)	(-1.91)
P1-P5		0.019	0.012	0.014	0.012	0.055	0.057	0.044	0.032
		(8.66)	(5.74)	(6.40)	(5.63)	(5.51)	(5.79)	(3.61)	(2.82)
Sharpe Ratio						0.661	0.718	0.460	0.390

Panel B: DPB

Portfolio	Mean	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Year 1	Year 2	Year 3	Year 4
P1	-2.691	0.006	0.002	0.001	0.001	0.009	0.015	0.018	0.006
		(3.44)	(1.29)	(0.45)	(0.68)	(1.12)	(1.86)	(1.64)	(0.59)
P3	-1.364	0.000	-0.001	0.001	0.001	0.000	-0.001	-0.003	0.003
		(-0.24)	(-0.67)	(0.88)	(0.74)	(-0.01)	(-0.21)	(-0.59)	(0.62)
P5	1.318	-0.004	-0.002	-0.003	-0.003	-0.010	-0.010	-0.006	-0.002
		(-4.54)	(-1.99)	(-2.92)	(-3.46)	(-2.74)	(-3.09)	(-1.80)	(-0.48)
P1-P5		0.010	0.004	0.004	0.005	0.019	0.025	0.024	0.008
		(5.64)	(2.28)	(2.16)	(2.72)	(2.32)	(3.26)	(2.13)	(0.67)
Sharpe Ratio						0.261	0.378	0.275	0.093

Panel C: DPE

Portfolio	Mean	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Year 1	Year 2	Year 3	Year 4
P1	-21.437	-0.004	-0.001	0.000	0.000	0.000	0.007	0.016	0.014
		(-1.80)	(-0.52)	(-0.04)	(-0.12)	(0.01)	(0.69)	(1.62)	(1.54)
P3	-4.522	0.003	0.002	0.001	0.002	0.003	-0.002	-0.005	-0.003
		(1.75)	(1.27)	(0.61)	(1.57)	(0.45)	(-0.36)	(-0.82)	(-0.46)
P5	27.701	0.000	0.000	-0.002	-0.003	-0.001	-0.002	0.000	-0.004
		(0.03)	(0.05)	(-1.07)	(-2.32)	(-0.11)	(-0.37)	(0.07)	(-0.69)
P1-P5		-0.004	-0.001	0.001	0.003	0.001	0.009	0.016	0.018
		(-1.83)	(-0.60)	(0.68)	(1.35)	(0.09)	(1.11)	(2.07)	(1.89)
Sharpe Ratio						0.011	0.132	0.231	0.214

Panel D: DPE2

Portfolio	Mean	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Year 1	Year 2	Year 3	Year 4
P1	-4.642	0.000	-0.001	0.000	0.003	0.007	0.011	0.015	0.010
		(0.07)	(-0.40)	(0.26)	(1.66)	(0.91)	(1.57)	(1.92)	(1.16)
P3	0.391	0.002	0.001	0.002	0.001	0.003	0.000	-0.006	-0.003
		(1.22)	(0.86)	(1.71)	(1.04)	(0.53)	(-0.07)	(-1.07)	(-0.58)
P5	9.752	-0.004	-0.001	-0.002	-0.004	-0.008	-0.006	-0.003	-0.002
		(-2.81)	(-0.64)	(-1.51)	(-2.90)	(-1.21)	(-0.82)	(-0.43)	(-0.50)
P1-P5		0.004	0.000	0.003	0.007	0.015	0.017	0.018	0.012
		(1.99)	(0.13)	(1.44)	(3.58)	(2.03)	(2.26)	(2.03)	(1.43)
Sharpe Ratio						0.219	0.261	0.237	0.162

provided in Table 2.4. As in Table 2.3, the hedge returns from these sorts, are economically smaller than the returns in Table 2.2 and not statistically significant.

3.4 Size and Book-to-Market Adjusted Stock Returns

The results presented in Table 2.2 are based on raw stock returns without any adjustments for risk. It is therefore possible that the results could be driven by systematic differences in risk across firms in the P1 and P5 portfolios. To address this issue we compute risk-adjusted stock returns of the various portfolios as follows. Specifically, we match every stock in each portfolio with a benchmark portfolio with roughly the same size and book-to-market multiple. In order to form the benchmark portfolios, we independently sort all stocks available at the beginning of any given month into five size categories and three book-to-market categories (by partitioning the sample based on each of the two metrics). The risk-adjusted return is then computed as the difference between the raw return and the return on the corresponding benchmark portfolio. The adjusted returns are then equal-weighted to compute portfolio returns over the holding period.

Table 5 presents these results. As before, Panel A presents size and BM-adjusted stock returns for strategies based on DEVS and Panels B, C and D report results for strategies based on DPB, DPE and DPE2 respectively. The returns in Table 5 are smaller in magnitude than those in Table 2.2, suggesting that some of the returns earned by the portfolios can be attributed to differences in size and book-to-market factors. However, the risk-adjusted returns are still quite large and both economically and statistically significant by years 2 and 3. Panel A shows that the high DEVS portfolio (P5) underperforms the low DEVS portfolio (P1) on a risk-adjusted basis by 5.5% in Year 1. As in panel A of Table 2, the underperformance persists in subsequent years. The results also confirm the findings in Table 2.2 that a significant portion of the difference (P5-P1) in the different panels comes from the long (P1) side. This suggests that the results are not driven by short-selling constraints.

The results in panels B, C and D which provide risk-adjusted returns using DPB, DPE and DPE2 shows that the high DPB, DPE and DPE2 portfolios (P5) underperform the low DPB, DPE and DPE2 portfolios (P1) by 2.5%, 0.9% and 1.7% respectively in Year 2 and 2.4%, 1.6% and 1.8% in Year 3. The underperformance persists in the second year following portfolio formation and is generally statistically significant at 1% level.

3.5 Fama-MacBeth Cross-Sectional Regressions

In this section, we run cross-sectional regressions that utilize stock returns of individual firms and allow us to control for individual firm characteristics. Specifically, we estimate the following multivariate regressions involving difference ranks, beta decile, size, and book-to-market (BM):

$$r_{i,t+k} = a + b\, DVR\_Rank_{i,t} + c\, Beta\_Decile_{i,t} + d\, SIZE_{i,t} + e\, BM_{i,t} + u_{i,t+k} \qquad (1)$$

where $r_{i,t+k}$ represents stock returns over the subsequent k years and $DVR\_Rank_{i,t}$ represents difference ranks (*DEVS_rank*, *DPB_rank*, *DPE_rank* and *DPE2_rank*). The ranks are computed each month by forming 10 portfolios based on the corresponding conditioning variable (DEVS etc.) and then assigning the portfolio rank of 1 for firms in the high difference portfolio and 10 for firms in the low difference portfolio. Using ranks is a way to mitigate any noise in the difference data due to the presence of outliers.

The regression is estimated each month and the time-series average of monthly slope coefficients and the corresponding time-series t-statistics are reported. Since

Table 2.6: Cross-Sectional Regression Involving Excess Valuation Ratios

This table reports the results from the following Fama-MacBeth regressions.

$$r_{i,t+k} = a + b\,DVR\_Rank_{i,t} + c\,Beta\_Decile_{i,t} + d\,SIZE_{i,t} + e\,BM_{i,t} + u_{i,t+k}$$

The dependent variables are future individual firm stock returns measured over each of the next four years. The independent variables are excess valuation ratio ranks (*DVR_Rank =DEVS_Rank, DPB_Rank*, *DPE_Rank* or *DPE2_Rank*), *Beta_Decile*, *SIZE*, and Book-to-market (*BM*). The ranks for individual firms are based on membership in decile portfolios in each month. Rank ranges from 1 (the lowest decile) to 10 (the highest decile). *Beta_Decile* calculated by CRSP as the beta decile portfolio to which the firm belongs. *Beta_Decile* ranges from 1 (the lowest) to 10 (the highest). The time-series average of slope coefficients and t-statistics (in parentheses) are reported. The t-statistics are computed using the Newey-West (1987) standard error correction. Panels A, B, C, and D report regressions based on DEVS, DPB, DPE and DPE2. The regressions are run using monthly data from 1977 to 2006. Coefficients of size variable are multiplied by 1,000.

Panel A: DEVS

	1yr rtn	1yr rtn	1yr rtn	2yr rtn	2yr rtn	2yr rtn	3yr rtn	3yr rtn	3yr rtn	4yr rtn	4yr rtn	4yr rtn
Intercept	0.137	0.145	0.150	0.137	0.137	0.140	0.139	0.136	0.135	0.139	0.127	0.119
	(5.88)	(4.63)	(4.53)	(6.55)	(4.81)	(4.68)	(6.25)	(4.44)	(4.19)	(5.88)	(4.10)	(3.95)
DEVS_Rank	0.006	0.006	0.006	0.006	0.006	0.005	0.005	0.005	0.004	0.004	0.004	0.004
	(4.72)	(4.59)	(4.29)	(4.56)	(4.91)	(4.33)	(3.10)	(3.18)	(3.01)	(2.89)	(3.49)	(3.18)
Beta_Decile		-0.002	-0.002		-0.001	-0.001		0.0003	0.0002		0.002	0.001
		(-0.54)	(-0.51)		(-0.24)	(-0.26)		(0.09)	(0.05)		(0.45)	(0.23)
SIZE			-0.003			-0.003			-0.001			-0.0002
			(-1.71)			(-1.35)			(-0.65)			(-0.15)
BM			0.0004			0.008			0.011			0.020
			(0.03)			(0.48)			(0.79)			(1.60)
Adj. R^2	0.008	0.036	0.054	0.006	0.030	0.042	0.007	0.032	0.042	0.006	0.032	0.040

Panel B: DPB

	1yr rtn	1yr rtn	1yr rtn	2yr rtn	2yr rtn	2yr rtn	3yr rtn	3yr rtn	3yr rtn	4yr rtn	4yr rtn	4yr rtn
Intercept	0.150	0.159	0.163	0.151	0.153	0.157	0.147	0.144	0.144	0.146	0.133	0.127
	(6.49)	(4.91)	(4.83)	(8.07)	(5.28)	(5.04)	(6.95)	(4.65)	(4.45)	(6.89)	(4.52)	(4.41)
DPB_Rank	0.004	0.004	0.004	0.003	0.003	0.002	0.003	0.003	0.002	0.003	0.003	0.002
	(2.47)	(2.52)	(2.83)	(2.68)	(2.69)	(1.78)	(2.57)	(2.44)	(2.11)	(2.25)	(2.45)	(1.53)
Beta_Decile		-0.002	-0.002		-0.001	-0.001		0.0002	0.0004		0.002	0.001
		(-0.60)	(-0.55)		(-0.31)	(-0.29)		(0.08)	(0.11)		(0.50)	(0.31)
SIZE			-0.003			-0.003			-0.002			0.0002
			(-1.59)			(-1.32)			(-0.77)			(0.12)
BM			-0.0004			0.011			0.009			0.021
			(-0.02)			(0.62)			(0.61)			(1.60)
Adj. R^2	0.008	0.036	0.053	0.004	0.028	0.040	0.004	0.030	0.040	0.005	0.032	0.039

TABLE 2.6 (continued)

Panel C: DPE												
	1yr rtn	1yr rtn	1yr rtn	2yr rtn	2yr rtn	2yr rtn	3yr rtn	3yr rtn	3yr rtn	4yr rtn	4yr rtn	4yr rtn
Intercept	0.169	0.175	0.175	0.158	0.158	0.158	0.152	0.148	0.144	0.142	0.129	0.120
	(8.13)	(5.86)	(5.54)	(8.28)	(5.63)	(5.28)	(7.17)	(4.87)	(4.55)	(6.93)	(4.32)	(4.18)
DPE_Rank	0.000	0.001	0.000	0.002	0.002	0.002	0.002	0.002	0.002	0.004	0.004	0.003
	(0.28)	(0.51)	(0.41)	(1.47)	(1.56)	(1.30)	(1.96)	(1.80)	(1.64)	(2.91)	(2.85)	(2.14)
Beta_Decile		-0.002	-0.002		-0.001	-0.001		0.001	0.0005		0.002	0.001
		(-0.49)	(-0.55)		(-0.22)	(-0.26)		(0.23)	(0.15)		(0.64)	(0.42)
SIZE			-0.003			-0.003			-0.002			0.0001
			(-1.59)			(-1.40)			(-0.78)			(0.08)
BM			0.010			0.012			0.016			0.023
			(0.57)			(0.79)			(1.09)			(1.80)
Adj. R^2	0.005	0.033	0.051	0.004	0.028	0.041	0.003	0.029	0.040	0.004	0.032	0.041
Panel D: DPE2												
	1yr rtn	1yr rtn	1yr rtn	2yr rtn	2yr rtn	2yr rtn	3yr rtn	3yr rtn	3yr rtn	4yr rtn	4yr rtn	4yr rtn
Intercept	0.153	0.160	0.164	0.148	0.150	0.153	0.148	0.144	0.143	0.139	0.127	0.122
	(7.56)	(5.34)	(5.15)	(8.02)	(5.11)	(4.97)	(7.47)	(4.78)	(4.52)	(7.11)	(4.40)	(4.30)
DPE2_Rank	0.003	0.003	0.003	0.004	0.004	0.003	0.003	0.003	0.002	0.004	0.004	0.003
	(2.52)	(2.48)	(2.47)	(2.97)	(3.06)	(2.67)	(2.52)	(2.31)	(2.07)	(3.84)	(3.48)	(2.71)
Beta_Decile		-0.001	-0.001		-0.001	-0.001		0.0005	0.001		0.002	0.001
		(-0.45)	(-0.45)		(-0.28)	(-0.24)		(0.15)	(0.17)		(0.56)	(0.36)
SIZE			-0.003			-0.003			-0.002			-0.0001
			(-1.58)			(-1.39)			(-0.82)			(-0.04)
BM			0.005			0.007			0.012			0.020
			(0.28)			(0.41)			(0.84)			(1.70)
Adj. R^2	0.005	0.034	0.052	0.004	0.028	0.041	0.004	0.029	0.040	0.004	0.032	0.040
N			239,145			233,912			221,449			209,642

future returns are computed over overlapping 12 month holding periods, the t-statistics are computed using the Newey-West autocorrelation correction with 11 lags.

The results from the cross-sectional regression are provided in Table 2.6. Panel A presents results involving DEVS ranks. Columns 2 and 5 of the panel which provide the results of the univariate regression of *DEVS_rank* on 1 and 2-year ahead returns suggest a significant association between DEVS and forward returns. This finding is consistent with Table 2.2. Further, columns 4 and 7 suggest that the association persists (though weaker as expected) despite controlling for size, BM and beta decile, which is consistent with results in Table 2.5. However, unlike the results in Tables 2 and 5 which focus on the top and bottom quintiles (which is where we expect to see the largest reversals), the results in this table are based on the entire sample. This suggests that the association between DEVS and future returns is robust to the inclusion of the entire sample. Panel B presents results using DPB ranks. The results in this panel are weaker than those in panel A. The coefficients on *DPB_rank* are positive and significant in the univariate regressions, but not significant in *K=2* once we include the risk controls. Panels C, and D present results using DPE and DPE2 ranks. The association between DPE, DPE2 and forward returns are evident primarily when *K=2* (columns 5-7). The coefficients on *DPE2_rank* are positive and significant in the univariate regressions (column 5). The results are robust to the inclusion of risk controls (column 7).

Overall, the findings in Tables 2.2, 2.5, and 2.6 indicate that standard risk adjustments cannot fully explain the negative relationship between the difference between actual and warranted multiples and stock returns.

3.6 Factor Risk Adjusted Stock Returns

In this section, we perform risk adjustments using a multi-factor model (consisting of market, size and book-to-market factors) that uses monthly calendar time excess returns. The calendar time approach provides test statistics that are better specified than those provided by the BHAR approach (see Fama (1998)). On the other hand, calendar time statistics may have lower power to reject the null (see Loughran and Ritter (2000)). Given the relative merits and demerits of the two approaches, empirically, our objective is to ensure that our results are robust to these different approaches to adjusting for risk.

Following Fama and French (1993), we consider a three factor model, *Mkt*-r_f (excess return on the NYSE/AMEX/Nasdaq value-weighted index), *SMB* which is a size factor, and *HML* which is a book-to-market factor. In addition we use *UMD*, a momentum factor (Carhart (1997)).[8] The resulting 4-factor model is provided below:

$$r_t - r_{f,t} = a + b(Mkt_t - r_{f,t}) + cSMB_t + dHML_t + eUMD_t + u_t \qquad (2)$$

where $r_t - r_f$ represents excess returns on portfolios based on the difference between actual and warranted multiples, and the slope coefficients represent the ex-post factor loadings or betas. a is the intercept which represents the risk-adjusted abnormal returns or the *alpha* of the portfolio.

Table 2.7 presents monthly risk-adjusted returns where the K-month holding period returns are computed as the average monthly return of strategies initiated at the beginning of the current month and the past K-1 months (*K=2* to *12*). As before, panel A presents results for strategies based on DEVS and panel B, C and D for

[8] These risk factors are downloaded from Kenneth R. French's website.

Table 2.7: Factor Adjusted Portfolio Returns

This table reports the results from the following factor regression based on monthly abnormal returns of stock portfolios based on the calendar time approach:

$$r_t - r_{f,t} = a + b(Mkt_t - r_{f,t}) + cSMB_t + dHML_t + eUMD_t + u_t$$

K-month holding period returns are computed as the average monthly return of strategies initiated at the beginning of the current month and the past K-1 months. Abnormal returns are computed with respect to one month t-bill returns. Following Fama and French (1993), we consider a three factor model, *Mkt-r_f* (excess return on the NYSE/AMEX/Nasdaq value-weighted index), *SMB* which is the size factor and *HML* which is the book-to-market factor. In addition we use *UMD*, a momentum factor (Carhart (1997)). The slope coefficients *b*, *c*, and *d* represent the ex-post factor loadings or betas. a is the intercept which represents the risk-adjusted abnormal returns of the portfolio. The numbers in parentheses are White's heteroskedasticity consistent standard error.

			Panel A: DEVS				
Portfolio	Cons.	Mkt-r_f	SMB	HML	UMD	Adj. R^2	N
P1	0.86	105.28	43.05	33.08	-15.70	0.91	340
	(8.50)	(30.64)	(6.57)	(6.59)	(-3.56)		
P3	0.59	100.22	46.54	39.56	-7.83	0.91	340
	(7.08)	(38.42)	(11.23)	(8.23)	(-2.76)		
P5	0.36	108.54	28.86	-3.86	-4.24	0.89	340
	(3.37)	(26.51)	(3.60)	(-0.62)	(-1.02)		
P1-P5	0.50	-3.27	14.18	36.94	-11.47	0.36	340
	(4.54)	(-1.06)	(3.62)	(8.83)	(-3.36)		
			Panel B: DPB				
Portfolio	Cons.	Mkt-r_f	SMB	HML	UMD	Adj. R^2	N
P1	0.69	110.86	51.77	30.34	-12.46	0.91	340
	(7.12)	(31.71)	(6.75)	(5.36)	(-2.57)		
P3	0.64	91.69	39.23	42.46	-9.75	0.91	340
	(8.16)	(37.81)	(12.08)	(10.06)	(-3.83)		
P5	0.46	114.67	30.64	-7.90	-3.02	0.90	340
	(4.63)	(31.12)	(3.96)	(-1.28)	(-0.74)		
P1-P5	0.23	-3.81	21.14	38.24	-9.44	0.42	340
	(2.40)	(-1.90)	(6.25)	(10.62)	(-2.90)		
			Panel C: DPE				
Portfolio	Cons.	Mkt-r_f	SMB	HML	UMD	Adj. R^2	N
P1	0.56	116.65	55.29	26.73	-19.37	0.90	340
	(4.94)	(24.72)	(5.37)	(3.72)	(-3.19)		
P3	0.69	91.85	35.51	39.03	-8.71	0.89	340
	(8.31)	(36.40)	(9.94)	(8.66)	(-3.12)		
P5	0.52	114.53	37.57	3.60	0.09	0.91	340
	(5.35)	(31.21)	(4.84)	(0.60)	(0.02)		
P1-P5	0.05	2.12	17.72	23.13	-19.46	0.36	340
	(0.49)	(0.83)	(4.06)	(5.20)	(-4.89)		
			Panel D: DPE2				
Portfolio	Cons.	Mkt-r_f	SMB	HML	UMD	Adj. R^2	N
P1	0.63	113.16	55.32	29.80	-16.70	0.90	340
	(5.66)	(26.39)	(5.77)	(4.41)	(-2.88)		
P3	0.69	91.54	36.34	41.32	-8.40	0.90	340
	(8.50)	(37.71)	(10.85)	(9.54)	(-3.24)		
P5	0.50	113.66	30.69	-5.15	-3.35	0.91	340
	(5.05)	(29.66)	(3.83)	(-0.83)	(-0.81)		
P1-P5	0.12	-0.50	24.62	34.95	-13.35	0.39	340
	(1.14)	(-0.22)	(6.06)	(8.42)	(-3.23)		

strategies based on DPB, DPE and DPE2. The results in panel A show that the high DEVS portfolio (P5) outperforms the low DEVS portfolio (P1) by 50 basis points per month (600 basis points annualized) on a risk-adjusted basis (see columns titled *Cons)*. The results also indicate a significant market-to-book effect across the portfolios. The difference in *HML* betas across the two groups suggests that the P1 portfolio consists of more value stocks as compared with the P5 portfolio (which is consistent with our sorting variable). Further, the P5 portfolio is slightly riskier and consists of larger stocks than the P1 portfolio.

Panels B, C, and D report similar results for strategies based on DPB, DPE, and DPE2, respectively. The intercepts of the P5-P1 portfolio are all in the right direction, although the magnitude is smaller than that for the DEVS portfolios and those for the DPE and the DPE2 portfolios are not statistically significant. The factors *HML* and *SMB* have the greatest influence in explaining hedge returns. This is not surprising given that the conditioning variables are attempting to separate between overvalued (glamour) and undervalued (value) stocks.

3.7 Robustness Tests

While the evidence thus far is indicative of firms being mispriced to some extent, we cannot rule out that an unknown or mis-measured risk factor is responsible for our results (especially since the hedge returns while being weaker do not fully disappear). To provide further comfort that our results are driven by mispricing (at least to some extent), we examine the consistency with which the hedged returns are generated over each quarter over the subsequent four years. The results are shown in Figure 1. The figures provide evidence that the hedge returns are generated reasonably consistently over time which is suggestive of mispricing rather than risk.

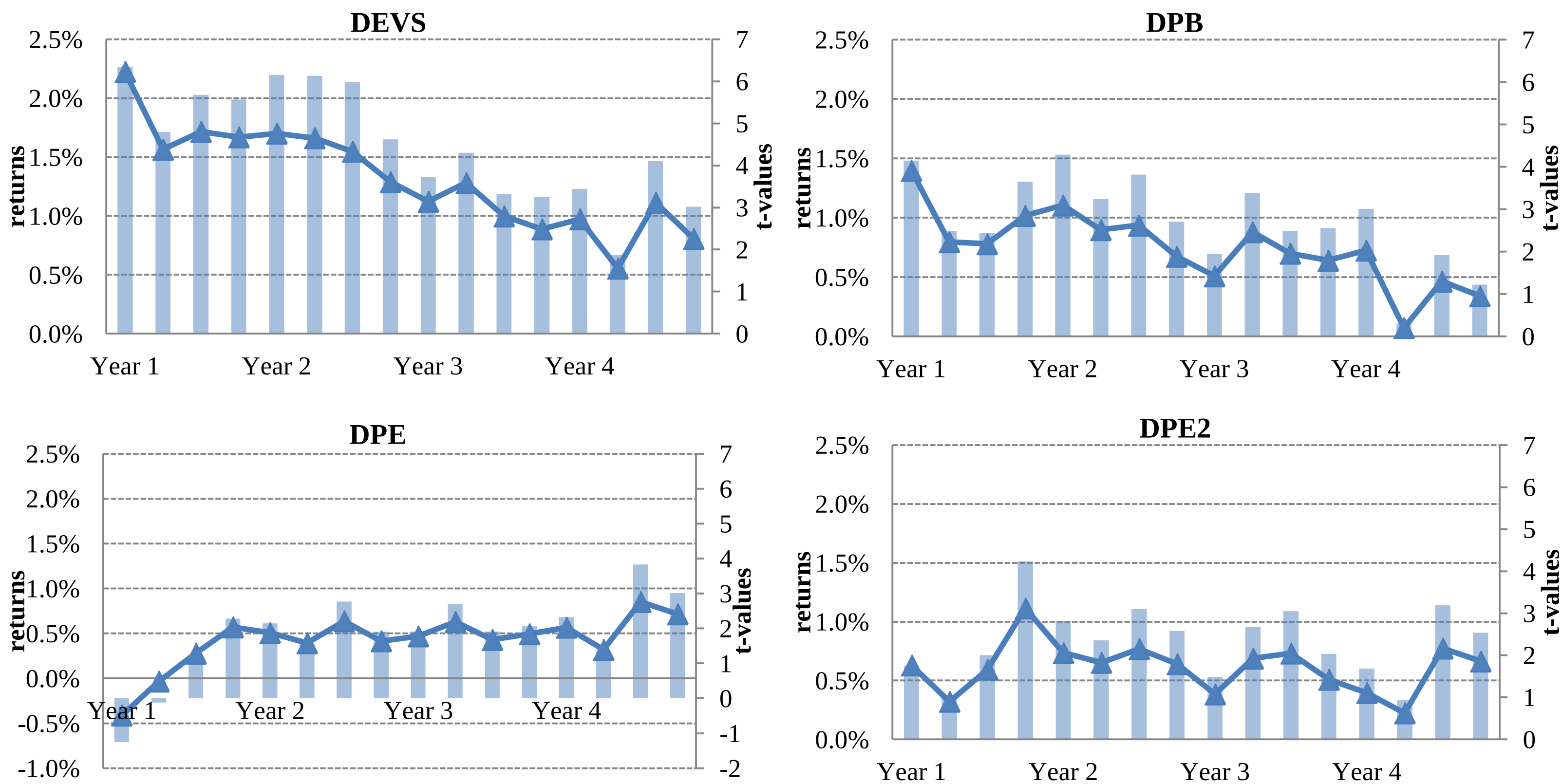

Figure 2.1: Returns on Long-Short Portfolios based on Excess Valuation Ratios

This figure shows average hedged returns over the next four years from investment portfolios strategies based on excess valuation ratios from January 1978 to December 2006. Excess valuation ratios are computed as valuation ratios minus warranted valuation ratios. Warranted valuation ratios are estimated based on the regressions in Table1b. Portfolio 1 (P1) and 5 (P5) are constructed from Table 2. The four excess valuation ratios are DEVS (based on excess EVS ratios), DPB (based on excess PB ratios), DPE (based on excess PE ratios), and DPE2 (based on excess PE2 ratios). The dashed bar reports New-West autocorrelation corrected t-statistics for the hedged returns. The triangle mark line is the hedged returns for each quarter which can earn by longing P1 portfolio and shorting P5 portfolio.

Table 2.8: Returns for Three-Day Windows around Subsequent Earnings Announcements

This table summarizes results in a three-day window around subsequent earnings announcements from investment portfolios strategies based on excess valuation ratios from January 1978 to December 2006. Excess valuation ratios are computed as valuation ratios minus warranted valuation ratios. Warranted valuation ratios are estimated based on the regressions in Table1b. The four excess valuation ratios are DEVS (based on excess EVS ratios), DPB (based on excess PB ratios), DPE (based on excess PE ratios), and DPE2 (based on excess PE2 ratios). Each month from January 1977 portfolios are formed based on the excess valuation ratios and divided into 5 equal-weighted portfolios. P1 represents portfolio consisting of firms with the lowest excess valuation ratios, while P5 represents firms with the highest ratios. Returns from these portfolios over the next four quarters and next four years are reported. The reported returns in columns with Qtr = 1, 2, 3, and 4 represent the portfolio means returns within a three-day window around earning-announcement dates in each of the next four quarters. The reported returns in columns with Year = 1, 2, 3, and 4 represent the portfolio means returns within a three-day window around earning-announcement dates in each of the next four years. The numbers in parentheses are the Newey-West autocorrelation corrected t-statistics. The number of lags used in the autocorrelation correction is 2 for quarterly returns and 11 for annual returns. Panels A, B, C, and D report stock returns earned based on DEVS, DPB, DPE and DPE2. The last row, % of 1 year returns, reports the percentage of the quarter or yearly P1-P5 returns that is due to the returns in the three-day earning announcement window.

				Panel A: DEVS				
Portfolio	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Year 1	Year 2	Year 3	Year 4
P1	0.004	0.003	0.004	0.003	0.020	0.018	0.017	0.013
	(4.74)	(3.49)	(4.82)	(1.93)	(3.27)	(5.64)	(4.81)	(3.07)
P5	0.002	0.002	0.001	0.002	0.008	0.009	0.013	0.015
	(2.58)	(2.64)	(1.21)	(2.20)	(3.26)	(3.74)	(4.19)	(5.10)
P1-P5	0.002	0.001	0.003	0.001	0.006	0.008	0.005	0.000
	(3.04)	(1.12)	(3.41)	(1.49)	(2.55)	(3.69)	(1.91)	(-0.01)
% of 1-Year Return	3.0%	1.1%	3.7%	1.8%	9.8%	13.2%	8.9%	-0.1%
				Panel B: DPB				
Portfolio	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Year 1	Year 2	Year 3	Year 4
P1	0.005	0.003	0.003	0.004	0.014	0.016	0.017	0.014
	(5.93)	(3.66)	(2.84)	(3.98)	(4.94)	(5.02)	(5.25)	(2.65)
P5	0.003	0.003	0.003	0.003	0.011	0.019	0.024	0.020
	(2.98)	(3.58)	(3.13)	(2.73)	(3.94)	(2.73)	(3.34)	(4.21)
P1-P5	0.002	0.000	0.000	0.000	0.002	0.003	-0.001	-0.005
	(2.75)	(-0.27)	(-0.08)	(0.60)	(0.84)	(1.64)	(-0.23)	(-0.81)
% of 1-Year Return	4.4%	-0.5%	-0.2%	1.2%	4.9%	9.0%	-1.4%	-17.0%
				Panel C: DPE				
Portfolio	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Year 1	Year 2	Year 3	Year 4
P1	0.002	0.003	0.003	0.003	0.014	0.018	0.018	0.019
	(2.36)	(3.34)	(2.61)	(2.86)	(4.35)	(5.35)	(5.45)	(5.86)
P5	0.004	0.003	0.003	0.002	0.013	0.011	0.016	0.014
	(4.30)	(3.20)	(2.58)	(2.42)	(4.78)	(3.55)	(5.72)	(3.47)
P1-P5	-0.002	0.000	0.001	0.001	0.001	0.005	0.002	0.006
	(-2.05)	(-0.07)	(0.42)	(1.32)	(0.55)	(2.47)	(0.92)	(1.85)
% of 1-Year Return	92.6%	-0.4%	2.3%	3.8%	-373.2%	19.2%	6.0%	19.1%
				Panel D: DPE2				
Portfolio	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Year 1	Year 2	Year 3	Year 4
P1	0.003	0.003	0.003	0.003	0.013	0.015	0.016	0.017
	(3.30)	(3.22)	(2.79)	(3.84)	(4.60)	(4.62)	(5.41)	(4.18)
P5	0.003	0.004	0.003	0.003	0.014	0.012	0.017	0.013
	(3.57)	(3.91)	(2.90)	(3.14)	(5.25)	(3.96)	(5.03)	(3.16)
P1-P5	0.000	-0.001	0.000	0.001	0.000	0.002	0.001	0.004
	(-0.25)	(-1.17)	(-0.26)	(0.85)	(-0.19)	(1.21)	(0.24)	(1.85)
% of 1-Year Return	-0.7%	-3.5%	-0.8%	1.5%	-1.6%	6.8%	1.4%	12.6%

We also examine the extent to which the returns are concentrated around the earnings announcement dates subsequent to portfolio formation. The results from this analysis are presented in Table 2.8. These results suggest that a significant part of the first and second year hedge returns are concentrated in the three day window around the subsequent earnings announcements. In the case of DEVS, approximately 9.8% of the first year hedge returns occur in 3 days around each of the four earnings announcements. The proportion increases in the second year to 13.2%. Similar increases can be seen in the other three panels. It is also reassuring that this ratio drops significantly in years 3 and 4. This evidence provides further support to mispricing playing a role in explaining the findings in this paper.

4. Summary

The objective of this paper is to test the efficacy of the warranted multiple approach (B&L 2002) by examining its ability to predict stock returns. To the extent that stock prices sometimes deviate from intrinsic value, and if the "warranted multiple" is a good measure of fundamental value, then any deviation between current and warranted multiples should reflect this mispricing. If the warranted multiple approach is effective in identifying situations of temporary mispricing, we should see a predictable pattern in the movement of future multiples and returns. Actual multiples should revert to predicted levels for firms with large differences which would be reflected in future returns performance. Consistent with this argument we find that the one-to-three year ahead stock returns of firms that appear overvalued (based on the difference between actual and warranted multiples) economically and statistically underperform the stock returns of firms that appear undervalued. Adjusting for known risk factors does not eliminate this finding. These results are consistent with the warranted multiple approach providing information about the fundamental value of the firm. It also indicates that current prices do not fully incorporate this information.

Our results provide evidence on the validity of the warranted multiples approach. The results suggest that the ad-hoc use of multiples can be improved upon by using a structured and disciplined approach. The warranted approach, while retaining many of the advantages (particularly simplicity) of multiples based valuation approaches, incorporates several of the advantages of the projected DCF method (particularly systematically incorporating the effect of risk and growth). This paper also contributes to the ongoing debate on risk vs. mispricing. The predictability of returns is consistent with the temporary mispricing of fundamental information by the equity markets. Further, correction of the mispricing occurs over the next three years, which is consistent with slow and incomplete adjustment to current information. However, it is also possible that the predictability in returns reflects an unknown risk factor or inadequate controls for risk.

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CHAPTER 3

COUNTRY, INDUSTRY AND IDIOSYNCRATIC COMPONENTS IN VALUATION RATIOS

(Joint with Sanjeev Bhojraj and David Ng)

1. Introduction

Traditional equity analysis and valuation involves comparing firms from the same country. In conducting their analysis, financial analysts (and academics) generally place firms from different countries into separate silos. However, recent trends compel us to rethink this problem. With increased global competition, many large- to mid-sized corporations now operate in multiple countries. Even domestic firms find their competitors are increasingly likely to be foreign. At the same time, firms are increasingly cross-listing in foreign exchanges and investors are venturing beyond domestic borders in search of attractive opportunities.[9] As global markets continue to integrate, the demand for analytical tools that facilitate comparison of firms from different countries has also increased.

Accounting-based market multiples are easily the most common technique in equity valuation. Even proponents of projected discounted cash flow (DCF) valuation methods frequently resort to using market multiples when estimating terminal values. Industry analysts and academics often use relative valuation techniques (based on accounting based multiples) in cross country settings. Furthermore, studies have shown the existence of value premiums, namely, the predictability of stock returns using valuation ratios in international markets.[10]

[9] The number of participating countries in ADRs has increased from 30 in 1990 to 83 in 2003 and the number of non-U.S. firms listing in the U.S. exceeding 2,000 in 2003 has increased more than double that in 1993 (see Karolyi (2006)).
[10] Fama and French (1998) and Liew and Vassalou (2000)

In November 2007, *The Economist* magazine examines cross-country differences in price-to-earnings multiples and reports that "the size of some price-to-earning ratios causes concern that a bubble is in the making."[11] The article mentions a difficulty in making cross-country comparison of price multiples: "The average price-to-earning ratio … may be distorted upwards because of a different industrial mix. Some types of businesses have consistently higher ratios, and [some] countries tend to have more of them."

Apparently, problems associated with international industrial structure often perceived as insurmountable obstacles that taint meaningful comparison of firms from different countries. Given the importance of accounting based multiples it is interesting and useful to understand what drives differences in these multiples across different countries.

In this study, we examine the importance of country, industry and firm idiosyncratic components in determining firm valuation ratios. Using a sample of firms from 33 countries, we decompose Book-to-Market (BM) and Earnings-to-Price (EP) ratios into country, industry, and idiosyncratic components. Given that the efficacy of accounting-based valuation techniques using valuation ratios hinges on the choice of the accounting variable, this understanding is a first step to facilitate relative valuation in an international setting. We begin by examining the relative importance of country membership after controlling for industry membership on BM and EP ratios. Our initial tests show that country membership (as captured by the country average of the ratios of all firms other than the firm in question) has a large effect on the two valuation ratios examined. In contrast, industry multiples have relatively little power in explaining the cross-sectional variations of firm valuation ratios.

[11] The Economist, Dizzy in Boomtown - Emerging economies, Nov 17, 2007.

We examine this issue in more detail by using an approach described in Heston and Rouwenhorst (1994) and Griffin and Karolyi (1998). The method isolates the pure country effects in stock returns by allowing the coefficients to vary by country and industry. We adopt this approach to decompose each firm valuation ratio into world, country, industry and firm-idiosyncratic components.[12] We regress firm valuation ratios on country and industry dummies and constrain the equal weighted average of the coefficients to equal zero.[13] Thus the coefficients that represent the country and industry effects can be interpreted as deviations from the world average ratio. The results from this analysis confirm the general findings of our previous analysis.

Previous literature (Fama and French (1998); Liew and Vassalou (2001); Asness, Moskowitz, and Pedersen (2009)) documents that value premium exists internationally. We confirm that BM and EP can predict subsequent stock returns around the world. We then examine whether the source of returns predictability comes from country-, industry-, or idiosyncratic firm-level valuation ratios. We find that most of the predictability comes from idiosyncratic component of the two ratios.

Fama and French (2007a, 2007b) show that migration in terms of BM ratios of stocks contributes to value premiums in the average returns. Value firms with high BM tend to have high returns, which leads to lower BM. Eventually such firms become part of the low BM portfolios. Similarly, growth firms with low BM tends to have low returns, leading these firms to become part of the high BM portfolios. Migration points to the importance of

[12] The dummy variable regression approach can be also used in other direction. For example, the earlier version of Hou, Karolyi and Kho (2009) also adopt the same methodology using seven accounting ratios with country and industry neutral hedge portfolios.
[13] We also proceed value weighted regression method in the robustness check section.

understanding the time variation in BM. A company's BM varies over time with different reasons. The movement could be influenced by country, industry or firm's own characteristics. We evaluate how Book-to-Market and Earnings-to-Price ratios change over time and find that the idiosyncratic and country components are the main drivers of the valuation ratios.

We further investigate the importance of country vs idiosyncratic proportion differs across countries. We find that such difference can be explained by country-level governance, market efficiency and capital openness and firm-level illiquidity and information uncertainty.

Finally, we examine the explanation that the average multiples across countries could be different because of the difference in industry composition. For instance, a country with more firms in high BM industries would have higher BM ratio. To understand the effect of industry composition on country valuation ratios, we extend the dummy variable approach by examining the extent to which the time series variance in a country's mean ratio is explained by the industry composition within the country. Our results suggest that industry composition only explains a small fraction (between 0.92% and 3.58%) of the variance in the country BM ratio. Thus industry not only has a direct impact on firm valuation ratios but also has an indirect influence through the effect on country average valuation ratios.

Our paper builds upon a stream of literature in finance that examines the importance of countries as diversification tools. Roll (1992) finds that industrial composition of a country plays a major role in explaining the returns of its stock market. Roll (1992) uses country and industrial index to arrive at this conclusion. Using company-level data, Heston and Rouwenhorst (1994) and Griffin and Karolyi (1998) find that industrial structure plays a very small role in explaining the cross-sectional difference in country return volatility.[14] They find that the country-specific sources of return variation are much more important. As a result, they conclude that diversifying across countries would provide more benefits than diversifying across industries. Using more recent data, some recent papers (e.g. Cavaglia, Brightman and Aked, 2000, Brooks and Del Negro, 2004, and Moerman 2008) find that industry factor is again becoming more important for diversification purpose, but it may be due to the rise of the information technology and telecommunication sectors. Bekaert, Hodrick and Zhang (2009) propose a risk-based factor structure in explaining international stock co-movement.

To gauge the economic significance of cross-country differences in valuation ratios, we document the predictability of the asset returns based on valuation ratios. In this sense, our paper is related to the value premium literature. Fama and French (1998) shows that value premium exist internationally and conjecture it is due to distress risk factor. Liew and Vassalou (2000) examine the extent to which the profitability of value trading strategy can be related to macroeconomic risk factors. Chapter 5 of this thesis documents the existence of the value premiums in 17 Organization for Economic Co-operation and Development (OECD) countries and relates it to long-run risk factors.

Our country-component of valuation ratio is related to the market synchronicity measure introduced in Morck, Yeung and Yu (2000), Durnev, Morck, Yeung and Zarowin (2003), Durnev, Morck and Yeung (2004), and Jin and Myers (2006). In their papers, when individual stock returns are regressed upon a country-level index, the R-squares obtained from such regression offer a measure of country-level market efficiency. Countries with low R-square produce more firm-level

[14] Heston and Rouwenhorst (1994) examines the importance of country and industry at firm level returns for European countries and Griffin and Karolyi (1998) expand the sample with fourty-four countries. However, they examine the country and industry issue using country and industry indexes.

information and hence the price discovery processes for these countries are more efficient. Countries with high R-square are less efficient. While the R-squares measures examine co-movements of stock returns on a monthly frequency, our measure provides a valuation-based alternative of how much country-level variation matters for firm variation. We find that country-level variation accounts for about 26% of firm variation in BM and EP ratios but it varies across countries.

Our paper is related to other studies that seek to explain cross-country differences in multiples, namely accounting differences, governance, growth and expected returns. French and Poterba (1991) examine how different accounting practices result in difference in Price-to-Earning ratios in Japan and US. Campbell and Shiller (1998, 2000) find that country-level PE and dividend-price ratios may contain information on future stock returns in twelve different countries. Specifically, they find that future stock returns tend to be low when price multiples are much higher than their long-run averages. Frankel and Lee (1999) examine the ability of a multiple based on analysts' forecasts to predict cross-sectional returns. Lee and Ng (2009) show that higher country-level corruption is associated with lower Price-to-Book and Tobin's Q ratios. Chua, Eun, and Lai (2007) find that governance, growth opportunities and capital market openness affect Tobin's Q in different countries. Bekaert, Harvey, Lundblad and Siegel (2007) find that a country's industrial composition affects future economic growth of a country. They create a measure of country growth opportunities by interacting a country's local industry mix with the global PE ratio and find that this strongly predicts future Gross Domestic Product (GDP) growth.

The rest of the paper is organized as follows. Section 2 details the data while section 3 discusses the summary statistics as well as the cross-sectional regressions. Section 4 provides details on the method used in the Heston and Rouwenhorst (1994) paper and discusses the results. Section 5 decomposes the time-series variation of valuation ratios and verifies country and firm characteristics influencing the firm-level variation. Section 6 examines the role of industry composition in determining country multiples. Section 8 concludes the paper.

2. Data

Our initial sample of international firms is derived from the Worldscope database. To ensure that there is reasonable number of firm-level observations in each country, the January 1990 to December 2006 time period is selected.[15] We select active/inactive firms listed in a major stock exchange market in a country during the period and choose firms in the intersection of (a) the Worldscope database and (b) the Datastream. In the case of the US, we use the merged COMPUSTAT/CRSP industrial and research files.

To be included in the sample, firms are required to have the following data items, market capitalization, total common equity, net income, fiscal year-end date, currency denomination, stock returns. Other data items such as total long-term and short-term debt, total asset, research and development, net sales, operating income are also obtained from the Worldscope database and the number of analysts, the standard deviation of earning forecasts for one-year ahead from I/B/E/S database.

We eliminate firms with negative common equity and net income, with market capitalization of less than fifty million and any firms with missing returns. [16] To facilitate estimation of a robust model, we require that all firms belong in an industry of 30 classifications defined in Kenneth French data library based on the four-digits

[15] The Worldscope database provides comprehensive international data from 1990.
[16] For the US, all balance sheet information used in the analysis is based on the most recent available quarter, while information relating to income statement items is based on the most recent trailing four quarters. To facilitate estimation of a robust model, we drop firms with prices below $3 per share and market capitalization of less than fifty million.

SIC industry codes.[17] To have a consistent country and industry analysis over time, we require that each country should have at least thirty member firms every year for at least ten years.[18] We also apply the same rule in industry groups. There are thirty-three countries with twenty-seven industries in the final sample. The number of remaining firms in the sample ranges from 5,771 (1990) to 14,254 (2006).

Our paper focuses on the global stock return predictability of valuation ratios: the book-to-equity (BM) and the earning-to-price equity (EP) ratio. BM is calculated using common equity item divided by market capitalization. EP is net income divided by market capitalization. We use accounting variables for the fiscal yearend in calendar year t-1 and market capitalization in December calendar year t-1. The top and bottom 1% of firms ranked by BM and EP for each country and each year are considered outliers and dropped.

For international stock returns, we apply the Ince and Porter's (2006) extreme and reversal filter to treat measurement errors in Datastream.[19] All stock returns in local currency are converted to US dollars terms using exchange rates obtained from Datastream. Monthly stock returns are used for forming portfolio returns in the main analysis and for calculating stock return volatility. We match the accounting data for the most recent fiscal yearend in calendar year t-1 with returns for July of calendar year t to June of year t+1 as described in Fama and French (1992). Stock return volatility is the standard deviation of monthly stock returns over a year. Daily stock returns are used for calculating illiquidity measurement as a proportion of zero daily returns given a month following Bekaert, Harvey and Lunblad (2007).

[17] We also tried 21 ISIC industry classification using FTSE 39 for international stocks and find that the results are similar.

[18] Otherwise, we have countries that have few stocks. Then, countries have become to matter too much

[19] Any return above 300% that is reversed within one month is considered as missing. Monthly returns above 400% are considered as missing. In other to exclude other outliers, monthly returns that fall out of the 0.5% and 99.5% percentile ranges in each country are dropped. Stocks that are less than 1 dollar per share in the previous month are dropped to minimize potential bias from penny stocks. We also drop extremely small firms with less than 1,000 dollar market capitalization.

3. Descriptive Statistics and Preliminary Analysis

Appendix Table A3.1 presents the number of firms in the data which consists of stocks in 33 countries in 27 industries from 1990 to 2006. Panel A reports the number of stocks and industries in each country. The number of stocks ranges from 5,449 in 1990 to 12,337 in 2006. Industrial countries constitute most of the observations at the beginning of our sample, but over time emerging country stocks have appeared. By 2006, there are 3,148 emerging country and 9,189 industrial country stocks in our sample. Most countries contain firms in all of the 27 industries. A few countries like Mexico, Philippines and Finland have smaller number of industries (21, 22, and 23).

Appendix Table A3.1 Panel B reports the number of stocks, and the country locations of these stocks, in each industry. Most industries are present in most countries. There are a few exceptions. For instance, aircraft, ships and railroad equipment (i.e. Carry) exist in only 23 of the 33 countries and mining industry stocks exist in only 25 countries. Following Griffin and Karolyi (1998), we separate industries into traded and non-traded sectors. There are 13 industries in the traded sector and 14 industries in the non-traded sector.

Table 3.1 Panel A reports equal-weighted summary statistics on monthly stock returns, BM, and EP ratios by country and industry. The overall equal-weighted averages of stock returns, BM, and EP across countries are 0.43%, 1.09, and 0.11, respectively, while the value-weighted averages are 0.57%, 0.69 and 0.08. Panel C suggests that there are substantial variations in valuation ratios as well as stock returns. Across industrial countries, mean BM ranges from 0.64 (U.S.) to 1.66 (Switzerland) and mean EP ranges from 0.04 (Japan) to 0.15 (Sweden). Across emerging markets, the variations across countries are even bigger. Overall, the standard deviations across

Table 3.1: Summary Statistics of Returns and Valuation Ratios

This table summarizes the mean and the standard deviation of yearly equally-weighted country/industry stock returns (Ret), BM and EP ratios in our data sample. BM is the most recent available book value divided by market value in June and EP is the earnings divided by market value. The sample period is 01/01/1990-12/31/2006 and the data covers 33 countries and 27 industries. Countries are classified into developed and emerging (E) market countries. Industries are classified into nontraded and traded (T) industries. Reported numbers are time-series means and the numbers in parenthesis are time-series standard deviations.

Country	Ret (%)	BM	EP	Industry	Ret (%)	BM	EP
Australia	-0.29 (0.04)	0.79 (0.08)	0.08 (0.01)	Beer	0.55 (0.02)	0.84 (0.08)	0.08 (0.01)
Austria	1.04 (0.03)	1.46 (0.35)	0.12 (0.03)	Games	0.11 (0.04)	0.76 (0.11)	0.07 (0.01)
Belgium	1.35 (0.03)	1.00 (0.27)	0.11 (0.03)	Books	0.09 (0.03)	0.66 (0.11)	0.08 (0.01)
Canada	0.91 (0.03)	1.04 (0.13)	0.11 (0.02)	Hshld	0.31 (0.03)	0.82 (0.15)	0.08 (0.01)
Denmark	1.34 (0.03)	1.24 (0.18)	0.12 (0.02)	Cnstr	-0.05 (0.04)	0.99 (0.28)	0.09 (0.02)
Finland	-0.42 (0.04)	1.39 (0.59)	0.13 (0.04)	Util	0.85 (0.02)	0.89 (0.09)	0.09 (0.01)
France	0.24 (0.03)	0.86 (0.14)	0.09 (0.01)	Telcm	0.33 (0.04)	0.82 (0.14)	0.08 (0.01)
Germany	0.73 (0.03)	0.80 (0.14)	0.08 (0.01)	Servs	0.44 (0.04)	0.59 (0.10)	0.07 (0.01)
Greece	-1.30 (0.09)	0.92 (0.31)	0.10 (0.05)	BusEq	0.43 (0.06)	0.61 (0.09)	0.06 (0.01)
Hong Kong	0.00 (0.06)	1.32 (0.29)	0.12 (0.01)	Trans	0.23 (0.03)	0.93 (0.17)	0.09 (0.01)
Italy	-1.82 (0.05)	1.53 (0.38)	0.12 (0.03)	Whlsl	0.52 (0.04)	0.85 (0.17)	0.08 (0.01)
Japan	1.66 (0.07)	0.73 (0.36)	0.04 (0.01)	Rtail	0.80 (0.03)	0.79 (0.08)	0.08 (0.01)
Netherlands	0.18 (0.03)	0.71 (0.15)	0.09 (0.01)	Meals	0.54 (0.03)	0.93 (0.11)	0.07 (0.01)
New Zealand	1.98 (0.05)	0.77 (0.08)	0.08 (0.01)	Fin	0.72 (0.03)	1.00 (0.08)	0.09 (0.01)
Norway	-0.04 (0.04)	1.11 (0.40)	0.13 (0.03)	Food (T)	0.68 (0.03)	0.87 (0.17)	0.08 (0.01)
Portugal	0.03 (0.04)	1.22 (0.14)	0.10 (0.02)	Clths (T)	0.05 (0.03)	0.97 (0.27)	0.09 (0.02)
Singapore	1.61 (0.08)	0.92 (0.25)	0.06 (0.02)	Hlth (T)	0.88 (0.04)	0.59 (0.09)	0.06 (0.01)
Spain	0.08 (0.04)	0.87 (0.19)	0.08 (0.01)	Chems (T)	0.28 (0.04)	0.91 (0.29)	0.08 (0.02)
Sweden	-1.32 (0.04)	1.29 (0.45)	0.15 (0.05)	Txtls (T)	-0.84 (0.03)	1.19 (0.34)	0.10 (0.02)
Switzerland	0.50 (0.03)	1.66 (0.52)	0.14 (0.03)	Steel (T)	0.14 (0.05)	1.10 (0.26)	0.09 (0.02)
U.K.	-0.36 (0.04)	0.73 (0.09)	0.08 (0.01)	FabPr (T)	0.85 (0.05)	0.89 (0.16)	0.08 (0.01)
U.S.A.	1.08 (0.03)	0.64 (0.10)	0.07 (0.01)	ElcEq (T)	0.35 (0.04)	0.71 (0.10)	0.07 (0.01)
Brazil (E)	1.26 (0.07)	2.96 (0.48)	0.28 (0.05)	Autos (T)	0.93 (0.04)	0.93 (0.23)	0.09 (0.02)
China (E)	2.37 (0.12)	0.39 (0.09)	0.03 (0.01)	Carry (T)	1.02 (0.04)	0.77 (0.12)	0.08 (0.01)
India (E)	2.01 (0.10)	1.05 (0.54)	0.12 (0.05)	Mines (T)	0.00 (0.05)	0.84 (0.15)	0.09 (0.02)
Malaysia (E)	-0.60 (0.09)	0.78 (0.35)	0.07 (0.02)	Oil (T)	0.66 (0.05)	0.72 (0.09)	0.07 (0.02)
Mexico (E)	1.77 (0.06)	1.57 (0.24)	0.17 (0.02)	Paper (T)	0.12 (0.03)	0.99 (0.22)	0.10 (0.02)
Philippines (E)	-1.84 (0.09)	1.53 (0.52)	0.12 (0.03)				
Poland (E)	0.23 (0.06)	0.95 (0.21)	0.09 (0.03)				
South Africa (E)	1.73 (0.08)	0.89 (0.18)	0.13 (0.03)				
South Korea (E)	0.00 (0.07)	1.52 (0.70)	0.11 (0.06)				
Taiwan (E)	1.08 (0.07)	0.67 (0.28)	0.05 (0.02)				
Turkey (E)	-0.87 (0.08)	0.63 (0.30)	0.13 (0.04)				
Developed.	0.33 (1.01)	1.04 (0.30)	0.10 (0.03)	Nontraded.	0.38 (0.39)	0.85 (0.16)	0.08 (0.01)
Emerging.	0.65 (1.36)	1.18 (0.71)	0.12 (0.07)	Traded.	0.54 (0.47)	0.85 (0.11)	0.08 (0.01)
All countries	0.43 (1.13)	1.09 (0.47)	0.11 (0.04)	All industries	0.41 (0.40)	0.85 (0.15)	0.08 (0.01)

all countries of mean BM and mean EP are 0.47 and 0.04. We compare our data to Land and Lang (2002) who provide descriptive statistics on EP and BM ratios for the seven countries in their sample for the period 1992 to 1999 and Hou, Karolyi and Kho (2009) for the forty nine countries for the period 1981 to 2003. A comparison shows that the EP ratios in this paper for the common subset of countries are similar to those documented in these papers. The equal-weighted averages of BM ratios in this paper are slightly higher than these documented in their paper. However, when we compare median values documented in Hou, Karolyi and Kho (2009), they are almost similar.[20] Industry columns show that there are also substantial variations in valuation ratios across different industries but such variations are much smaller compared to country-level variations. Mean BM ranges from 0.59 (Health) to 1.19 (textile), and EP ranges from 0.06 (Health and Business Equipment) to 0.1 (Textile and Clothes). The standard deviations across different industries of mean BM and mean EP are 0.15 and 0.01. It is possible that countries have high valuation ratios because they tend to concentrate on industries with high valuation ratios. Conversely, it is possible that industries have high valuation ratios because they tend to be situated in countries with high valuation ratios. It is also true that different multiples appear to provide different measures of firm values. For example, Italy appears to have the cheapest stock market among industrial countries in terms of BM, but its country valuation is around the median by EP.

To understand the importance of country and industry memberships in explaining cross-sectional variation in firm valuation ratios, we run regression of firm BM and EP ratios on the country and industry averages.[21] To address the issue of

[20] Median values can be provided upon request.
[21] To avoid a firm's valuation ratio being regressed on itself, we exclude a firm's own valuation ratio when we construct the country and industry means. The results are similar when we include the firm's own valuation ratio when we construct the country and industry means.

cross-sectional dependence, we adjust the standard errors by using both country and industry clusters.[22]

Table 3.2 provides the results of the regressions. The first interesting feature of the results in Table 3.2 is that country valuation ratios have a significant effect on firm valuation ratios. The R-square on country BM regression (22%) is much bigger than that on industry BM (6%). After controlling for country differences, industry-based differences (as captured by the industry mean of this ratio) have lower power in explaining cross-sectional variations in BM. The coefficient on country BM is 0.92 compared to a coefficient of 0.57 on industry BM. We find that the same order persists after adjusting for other firm level factors like leverage, profit margin, and return on equity. This suggests that country membership provides information on a firm's BM, which is incremental to the other factors. Similarly, we find significant country-level variations in EP. The R-square on country EP regression is 0.20 which is significantly larger than the R-square on industry EP (0.03). Controlling for leverage does not affect the result. As robustness checks, we also run regressions (unreported) based on value-weighted mean BM and EP, and obtain similar results.

[22] See Peterson (2007). Fama-MacBeth regressions with adjusted standard errors for autocorrelation across times yield similar results.

Table 3.2: Country vs Industry determinants on Valuation Ratios

This table reports the results from pooled estimation regressions. The reported t-statistics are from two-dimension (country and industry) clustered standard errors. The dependent variables are the book-to-market ratio (BM) and earnings yield (EP) of a firm in June every year. The explanatory variables are as follows: Country BM and Country EP are the country mean of the ratio. Industry BM and Industry EP refer to the industry mean of the value ratios based on Ken French's 27 industry code classification. Profit margin is defined as Net Income/Net Sales. Return on Equity is the return on equity, that is, net income scaled by the end of period common equity. Leverage is the total debt scaled by total equity. All regression specifications include Year dummy variables. Intercept is suppressed.

Independent Variables	Dependent Variable : BM				Independent Variables	Dependent Variable : EP			
	reg1	reg2	reg3	reg4		reg1	reg2	reg3	reg4
Country BM	0.98		0.92	0.90	Country EP	0.98		0.95	0.95
	(35.47)		(25.08)	(24.48)		(47.00)		(32.67)	(32.36)
Industry BM		0.95	0.57	0.50	Industry EP		0.91	0.51	0.51
		(8.95)	(8.28)	(7.73)			(10.46)	(5.47)	(5.54)
Leverage				0.03	Leverage				0.00
				(1.34)					(3.42)
Profit Margin				0.00					
				(-0.52)					
ROE				-1.33					
				(-6.11)					
Adj. R-sqr	0.22	0.06	0.24	0.28	Adj. R-sqr	0.20	0.03	0.21	0.21
Avg. No. of Firms	9,108	9,108	9,108	8,898	Avg. No. of Firms	9,108	9,108	9,108	9,108

4. Country and Industry Decomposition of Firm Valuation Ratios

The above regression analysis confirms that firms' valuation ratios are highly related to country and industry memberships and suggests that country plays a more important role than industry in explaining cross-sectional variation in firm level ratios. However, the results above show that R-squares are not close to 1, leaving significant portion with unexplained variations in valuation ratios on the firm level. To isolate country-, industry- and firm-level variations in BM on global value premium, we decompose BM into country, industry and firm idiosyncratic components. To do so, we adopt the methodology detailed in Heston and Rouwenhorst (1994) and Griffin and Karolyi (1998).

Specifically, a valuation ratio equals the sum of a constant and the country, industry and firm idiosyncratic components;

$$BM_{i,t} = \alpha_t + \beta_{j,t} + \gamma_{k,t} + e_{i,t} \qquad (1)$$

where α_t is a constant in period t. $\beta_{j,t}$ is the industry effect. $\gamma_{k,t}$ is the country effect. $e_{i,t}$ is a firm idiosyncratic component. It is assumed that $e_{i,t}$ has a mean of zero and a finite variance, and is not correlated across different firms.

We empirically estimate these components following Heston and Rouwenhorst (1994) dummy variable regression methodology.[23] Industry dummy $I_{i,j}$ is equal to one if firm i is in industry j and zero otherwise. Country dummy $C_{i,k}$ is equal to one if firm i is in country k and zero otherwise. For simplification, we drop time subscript t in the next equations. In each period, the regression equation is:

$$\begin{aligned} BM_i &= \alpha + \beta_1 I_{i1} + \beta_2 I_{i2} + \ldots + \beta_{27} I_{i27} \\ &+ \gamma_1 C_{i1} + \gamma_2 C_{i2} + \ldots + \gamma_{33} C_{i33} + e_i \end{aligned} \qquad (2)$$

[23] Heston and Rouwenhorst (1994) adapt the dummy variable regressions for country and industry return decomposition from Suit (1984) and Kennedy (1989). We apply the regression method on valuation ratio decomposition. Our regression does not suffer from non-stationary independent variable issues as we regress VR on country and industry dummies every year, which means that in the regression, there is no time variable. Moreover, Suit (1984) and Kennedy (1986) didn't mention non-stationary issue

Running a regression on (2) involves an identification problem, since each firm i belongs to a particular industry and a particular country and all dummies add up to one. One way to resolve this identification problem is through picking one country and one industry as a benchmark. The dummy variable coefficients can then be interpreted as the differences from the benchmark.

In order to avoid using an arbitrary benchmark of a particular country and industry, we impose the constraint that for an equal weighted portfolio, the sum of the industry coefficients equals zero, and the sum of country coefficients also equals zero. (Suit (1984); Kennedy (1986))

$$\sum_{j=1}^{27} n_j \beta_j = 0 \tag{3a}$$

$$\sum_{k=1}^{33} m_k \gamma_k = 0 \tag{3b}$$

where n_j and m_k represent the number of firms in industry j and country k respectively. This way, we can interpret the intercept as the average valuation ratio in the world. The coefficients represent how each country and industry differs from the average firm in our sample. In other words, we measure country and industry effects relative to an equal-weighted valuation ratio in the world portfolio.

Value-weighted BM based on lag market capitalization. The only difference is that we replace the constraints in (3a) and (3b) with the following constraints.

$$\sum_{j=1}^{27} w_j \beta_j = 0 \text{ and } \sum_{j=1}^{27} w_j = 1 \tag{3a'}$$

$$\sum_{k=1}^{33} v_k \gamma_k = 0 \text{ and } \sum_{k=1}^{33} v_k = 1 \tag{3b'}$$

where w_j and v_k represent the value weights of industry j and country k. We report value-weighted results in the robustness check section.

4.1 Country versus Industry Results

We estimate equation (2) with least square subject to the constraints in equations (3a) and (3b). The monthly cross-sectional regressions provide time-series estimates of the intercepts and the industry and country coefficients. The intercept represents the world average firm multiple while the coefficient $\widehat{\beta}_j$ is the pure industry effect relative to the average firm while $\hat{\gamma}_k$ is the pure country effect relative to the average firm.

Table 3.3 provides the time series average of the pure industry and country effect coefficients. The equal-weighted world average of BM is 0.86. The pure country adjustment for BM ranges from a high of 1.96 for Brazil to a low of -0.51 for China. The pure industry adjustment ranges from a high 0.28 for textile to a low of -0.23 for the health industry. It is noteworthy that the standard deviation of adjustments across countries is 0.45 while standard deviation of adjustments across industries is 0.13. When we only focus on developed countries from the data sample, we still find that there is substantially higher standard deviation in country effects (0.28) compared to standard deviation in industry effects. Similarly, the standard deviation of country EP adjustments is much higher compared to the standard deviation across industry EP adjustments. This suggests that pure country effect has a much higher variance across countries as compared with industries. Country differences are more important than industry differences in explaining cross sectional variation in the BM and EP multiples which is consistent with the findings in Table 3.3. In robustness check, we also examine the value weighted averages and find similar pattern.

Table 3.4 presents another view of the estimation results in a country by industry matrix. For a given firm, a warranted valuation ratio is the summation of the world average, the country pure effect and the industry pure

Table 3.3: Country and Industry Adjustments on Valuation Ratios

This table shows the time-series average of the world average (in italic); pure country adjustment; and pure industry adjustment coefficients using Heston and Rouwenhorst (1994) regression methods. The following regression is done across firms for each year. I and C are industry and country dummy variables.

$$BM_i = \alpha + \beta_1 I_{i1} + \beta_2 I_{i2} + ... + \beta_{27} I_{i27} + \gamma_1 C_{i1} + \gamma_2 C_{i2} + ... + \gamma_{33} C_{i33} + e_i$$

$$\text{with } \sum_{j=1}^{27} n_j \beta_j = 0 \text{ and } \sum_{k=1}^{33} m_k \gamma_k = 0$$

α is world base level, β_j is adjustment coefficient for industry j and γ_k is adjustment coefficient for country k. n is the number of firms in industry j and m is the number of firms in country k. The data sample involves firm-level observations in 33 countries and 27 industries from 1990 to 2006. The two valuation ratios examined are BM and EP. The bottom of each panel is the standard deviation of the pure country and industry effects. (E) next to country name indicates emerging market countries and (T) indicates traded goods industry. The reported results are from equal-weighted regression method. Numbers in parenthesis are Newey-West (1989) t-statistics with one year lag.

Panel A: BM

World Average	*0.86*	*(24.38)*			
Pure country adjustment			Pure industry adjustment		
Australia	-0.07	(-2.17)	Beer	-0.07	(-4.36)
Austria	0.52	(4.92)	Games	-0.08	(-5.53)
Belgium	0.08	(0.80)	Books	-0.17	(-9.64)
Canada	0.19	(3.57)	Hshld	-0.04	(-5.20)
Denmark	0.33	(4.39)	Cnstr	0.14	(3.06)
Finland	0.49	(2.37)	Util	-0.03	(-1.77)
France	0.00	(0.00)	Telcm	-0.19	(-3.50)
Germany	-0.06	(-1.70)	Servs	-0.21	(-14.33)
Greece	0.00	(-0.01)	BusEq	-0.19	(-4.82)
Hong Kong	0.43	(6.42)	Trans	0.03	(1.21)
Italy	0.60	(3.88)	Whlsl	-0.01	(-0.58)
Japan	-0.12	(-1.35)	Rtail	-0.04	(-3.27)
Netherlands	-0.15	(-2.57)	Meals	0.10	(12.82)
New Zealand	-0.18	(-4.27)	Fin	0.13	(14.96)
Norway	0.23	(2.64)	Food (T)	-0.01	(-0.93)
Portugal	0.31	(7.65)	Clths (T)	0.12	(3.13)
Singapore	0.05	(0.92)	Hlth (T)	-0.23	(-12.71)
Spain	-0.05	(-0.62)	Chems (T)	0.03	(0.99)
Sweden	0.41	(2.59)	Txtls (T)	0.28	(4.84)
Switzerland	0.75	(3.78)	Steel (T)	0.20	(8.01)
United Kingdom	-0.12	(-3.98)	FabPr (T)	0.03	(2.08)
United States	-0.21	(-5.04)	ElcEq (T)	-0.10	(-4.94)
Brazil (E)	1.96	(9.39)	Autos (T)	0.07	(3.28)
China (E)	-0.51	(-6.14)	Carry (T)	-0.07	(-4.36)
India (E)	0.15	(0.98)	Mines (T)	-0.04	(-1.01)
Malaysia (E)	-0.10	(-1.25)	Oil (T)	-0.14	(-10.21)
Mexico (E)	0.62	(10.46)	Paper (T)	0.07	(1.89)
Philippines (E)	0.62	(3.88)			
Poland (E)	-0.02	(-0.37)			
South Africa (E)	0.03	(0.97)			
South Korea (E)	0.68	(3.50)			
Taiwan (E)	-0.19	(-2.58)			
Turkey (E)	-0.29	(-3.81)			
Dev. S.D.	0.28		Nontraded S.D.	0.12	
Emg. S.D.	0.68		Traded S.D.	0.14	
All S.D.	0.45		All S.D.	0.13	

Table 3.3 (continued)

Panel B: EP

World Average	*0.08*	*(33.37)*			
Pure country adjustment			Pure industry adjustment		
Australia	0.00	(1.10)	Beer	-0.01	(-4.35)
Austria	0.03	(3.73)	Games	-0.01	(-6.32)
Belgium	0.03	(2.73)	Books	-0.01	(-7.27)
Canada	0.03	(6.27)	Hshld	0.00	(0.76)
Denmark	0.03	(7.39)	Cnstr	0.01	(4.89)
Finland	0.05	(3.95)	Util	0.00	(-0.82)
France	0.01	(2.08)	Telcm	-0.01	(-2.73)
Germany	0.00	(-0.87)	Servs	-0.01	(-8.90)
Greece	0.01	(0.69)	BusEq	-0.01	(-4.96)
Hong Kong	0.04	(13.84)	Trans	0.00	(1.54)
Italy	0.03	(3.22)	Whlsl	0.00	(1.22)
Japan	-0.05	(-10.83)	Rtail	0.00	(-4.87)
Netherlands	0.01	(1.30)	Meals	-0.01	(-5.47)
New Zealand	0.00	(-0.91)	Fin	0.01	(5.77)
Norway	0.05	(5.97)	Food (T)	0.00	(-0.23)
Portugal	0.01	(2.49)	Clths (T)	0.01	(5.07)
Singapore	-0.02	(-3.62)	Hlth (T)	-0.02	(-14.64)
Spain	0.00	(-0.88)	Chems (T)	0.00	(1.58)
Sweden	0.07	(4.56)	Txtls (T)	0.01	(3.69)
Switzerland	0.05	(4.57)	Steel (T)	0.01	(3.20)
United Kingdom	0.00	(0.89)	FabPr (T)	0.01	(3.61)
United States	-0.01	(-3.34)	ElcEq (T)	-0.01	(-5.45)
Brazil (E)	0.19	(12.67)	Autos (T)	0.01	(4.42)
China (E)	-0.05	(-8.46)	Carry (T)	0.00	(-0.61)
India (E)	0.04	(2.80)	Mines (T)	-0.01	(-3.43)
Malaysia (E)	-0.02	(-3.16)	Oil (T)	-0.01	(-3.02)
Mexico (E)	0.08	(12.16)	Paper (T)	0.01	(2.26)
Philippines (E)	0.03	(3.15)			
Poland (E)	0.00	(0.18)			
South Africa (E)	0.05	(5.85)			
South Korea (E)	0.03	(1.76)			
Taiwan (E)	-0.03	(-5.62)			
Turkey (E)	0.04	(3.97)			
Dev. S.D.	0.03		Nontraded S.D.	0.01	
Emg. S.D.	0.07		Traded S.D.	0.01	
All S.D.	0.04		All S.D.	0.01	

Table 3.4: Country-Industry Mean Matrix

This table shows world-country-industry adjustment BM matrix. The world average is in bold, the first column in italic is the time-series average of country adjustment coefficient (Cty. Adj.), the first row in italic is the time-series average of industry adjustment (Industry Adj.). Each cell is time-series average of firm BM explained by world, country and industry as the sum of world, country adjustment and industry adjustment coefficients. Countries are classified in developed and emerging market countries based on MSCI classification. Dev.S.D, Emg. S.D. and All S.D. indicate the standard deviations across developed, emerging market all countries. Industries based on 30 SIC codes are classified into non-traded and traded industries in Griffin and Karolyi (1998).

	Cty	Non-Traded													
	Adj.	Beer	Games	Books	Hshld	Cnstr	Util	Telcm	Servs	BusEq	Trans	Whlsl	Rtail	Meals	Fin
Industry Adj.	***0.86***	*-0.07*	*-0.08*	*-0.17*	*-0.04*	*0.14*	*-0.03*	*-0.19*	*-0.21*	*-0.19*	*0.03*	*-0.01*	*-0.04*	*0.10*	*0.13*
Australia	*-0.07*	0.72	0.71	0.62	0.74	0.93	0.75	0.59	0.57	0.60	0.82	0.78	0.75	0.89	0.92
Austria	*0.52*	1.30	1.29	1.20	1.33	1.51	1.34	1.18	1.16	1.18	1.40	1.36	1.33	1.47	1.50
Belgium	*0.08*	0.87	0.86	0.77	0.89	1.08	0.90	0.74	0.72	0.75	0.97	0.93	0.90	1.03	1.06
Canada	*0.19*	0.98	0.97	0.88	1.01	1.19	1.02	0.86	0.84	0.86	1.08	1.04	1.01	1.15	1.18
Denmark	*0.33*	1.11	1.11	1.02	1.14	1.32	1.15	0.99	0.97	0.99	1.22	1.17	1.14	1.28	1.31
Finland	*0.49*	1.28	1.27	1.18	1.30	1.49	1.31	1.15	1.13	1.16	1.38	1.34	1.31	1.44	1.47
France	*0.00*	0.79	0.78	0.69	0.81	1.00	0.82	0.66	0.64	0.67	0.89	0.85	0.82	0.96	0.99
Germany	*-0.06*	0.73	0.72	0.63	0.75	0.94	0.76	0.60	0.58	0.61	0.83	0.79	0.76	0.89	0.92
Greece	*0.00*	0.79	0.78	0.69	0.81	1.00	0.82	0.66	0.64	0.67	0.89	0.85	0.82	0.95	0.98
Hong Kong	*0.43*	1.22	1.21	1.12	1.24	1.42	1.25	1.09	1.07	1.09	1.32	1.27	1.24	1.38	1.41
Italy	*0.60*	1.39	1.38	1.29	1.41	1.59	1.42	1.26	1.24	1.27	1.49	1.44	1.42	1.55	1.58
Japan	*-0.12*	0.67	0.66	0.57	0.69	0.88	0.70	0.54	0.52	0.55	0.77	0.73	0.70	0.84	0.87
Netherlands	*-0.15*	0.64	0.63	0.54	0.66	0.85	0.67	0.51	0.49	0.52	0.74	0.70	0.67	0.81	0.84
New Zealand	*-0.18*	0.61	0.60	0.51	0.63	0.82	0.64	0.48	0.46	0.49	0.71	0.67	0.64	0.78	0.81
Norway	*0.23*	1.02	1.01	0.92	1.04	1.23	1.05	0.90	0.87	0.90	1.12	1.08	1.05	1.19	1.22
Portugal	*0.31*	1.10	1.09	1.00	1.12	1.31	1.13	0.98	0.95	0.98	1.20	1.16	1.13	1.27	1.30
Singapore	*0.05*	0.84	0.83	0.74	0.87	1.05	0.88	0.72	0.70	0.72	0.94	0.90	0.87	1.01	1.04
Spain	*-0.05*	0.74	0.73	0.64	0.76	0.95	0.77	0.61	0.59	0.62	0.84	0.80	0.77	0.90	0.93
Sweden	*0.41*	1.20	1.19	1.10	1.23	1.41	1.24	1.08	1.06	1.08	1.30	1.26	1.23	1.37	1.40
Switzerland	*0.75*	1.54	1.53	1.44	1.56	1.75	1.57	1.42	1.39	1.42	1.64	1.60	1.57	1.71	1.74
U.K.	*-0.12*	0.67	0.66	0.57	0.69	0.88	0.71	0.55	0.53	0.55	0.77	0.73	0.70	0.84	0.87
U.S.A	*-0.21*	0.58	0.57	0.48	0.60	0.79	0.61	0.45	0.43	0.46	0.68	0.64	0.61	0.75	0.77
Brazil (E)	*1.96*	2.75	2.74	2.65	2.77	2.96	2.78	2.62	2.60	2.63	2.85	2.81	2.78	2.91	2.94
China (E)	*-0.51*	0.28	0.27	0.18	0.30	0.49	0.32	0.16	0.14	0.16	0.38	0.34	0.31	0.45	0.48
India (E)	*0.15*	0.94	0.93	0.84	0.96	1.14	0.97	0.81	0.79	0.81	1.04	0.99	0.96	1.10	1.13
Malaysia (E)	*-0.10*	0.69	0.68	0.59	0.71	0.90	0.72	0.57	0.54	0.57	0.79	0.75	0.72	0.86	0.89
Mexico (E)	*0.62*	1.40	1.39	1.30	1.43	1.61	1.44	1.28	1.26	1.28	1.50	1.46	1.43	1.57	1.60
Philippines (E)	*0.62*	1.41	1.40	1.31	1.44	1.62	1.45	1.29	1.27	1.29	1.51	1.47	1.44	1.58	1.61
Poland (E)	*-0.02*	0.77	0.76	0.67	0.79	0.98	0.80	0.64	0.62	0.65	0.87	0.83	0.80	0.93	0.96
South Africa (E)	*0.03*	0.82	0.81	0.72	0.84	1.03	0.85	0.69	0.67	0.70	0.92	0.88	0.85	0.98	1.01
South Korea (E)	*0.68*	1.47	1.46	1.37	1.49	1.68	1.50	1.34	1.32	1.35	1.57	1.53	1.50	1.63	1.66
Taiwan (E)	*-0.19*	0.60	0.59	0.50	0.62	0.81	0.63	0.48	0.45	0.48	0.70	0.66	0.63	0.77	0.80
Turkey (E)	*-0.29*	0.50	0.49	0.40	0.52	0.71	0.53	0.37	0.35	0.38	0.60	0.56	0.53	0.67	0.70
Dev. S.D.	*0.28*	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28
Emg. S.D.	*0.68*	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68
All S.D.	*0.45*	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45

Table 3.4 (continued)

	Traded												
	Food	Clths	Hlth	Chems	Txtls	Steel	FabPr	ElcEq	Autos	Carry	Mines	Oil	Paper
Industry adj.	*-0.01*	*0.12*	*-0.23*	*0.03*	*0.28*	*0.20*	*0.03*	*-0.10*	*0.07*	*-0.07*	*-0.04*	*-0.14*	*0.07*
Australia	0.77	0.91	0.56	0.82	1.06	0.98	0.82	0.68	0.86	0.72	0.75	0.65	0.86
Austria	1.36	1.50	1.14	1.40	1.65	1.57	1.41	1.27	1.44	1.30	1.33	1.24	1.45
Belgium	0.92	1.06	0.71	0.96	1.21	1.13	0.97	0.83	1.00	0.87	0.90	0.80	1.01
Canada	1.04	1.17	0.82	1.08	1.33	1.24	1.08	0.95	1.12	0.98	1.01	0.91	1.12
Denmark	1.17	1.31	0.95	1.21	1.46	1.38	1.22	1.08	1.25	1.11	1.14	1.05	1.26
Finland	1.33	1.47	1.12	1.37	1.62	1.54	1.38	1.24	1.41	1.28	1.31	1.21	1.42
France	0.84	0.98	0.63	0.89	1.13	1.05	0.89	0.75	0.93	0.79	0.82	0.72	0.93
Germany	0.78	0.92	0.57	0.82	1.07	0.99	0.83	0.69	0.86	0.73	0.76	0.66	0.87
Greece	0.84	0.98	0.63	0.88	1.13	1.05	0.89	0.75	0.92	0.79	0.82	0.72	0.93
Hong Kong	1.27	1.41	1.05	1.31	1.56	1.48	1.32	1.18	1.35	1.22	1.24	1.15	1.36
Italy	1.44	1.58	1.23	1.48	1.73	1.65	1.49	1.35	1.52	1.39	1.42	1.32	1.53
Japan	0.72	0.86	0.51	0.77	1.01	0.93	0.77	0.63	0.81	0.67	0.70	0.60	0.81
Netherlands	0.69	0.83	0.48	0.74	0.98	0.90	0.74	0.60	0.78	0.64	0.67	0.57	0.78
New Zealand	0.66	0.80	0.45	0.70	0.95	0.87	0.71	0.57	0.75	0.61	0.64	0.54	0.75
Norway	1.08	1.21	0.86	1.12	1.36	1.28	1.12	0.99	1.16	1.02	1.05	0.95	1.16
Portugal	1.15	1.29	0.94	1.20	1.44	1.36	1.20	1.07	1.24	1.10	1.13	1.03	1.24
Singapore	0.90	1.03	0.68	0.94	1.19	1.11	0.95	0.81	0.98	0.84	0.87	0.78	0.98
Spain	0.79	0.93	0.58	0.83	1.08	1.00	0.84	0.70	0.87	0.74	0.77	0.67	0.88
Sweden	1.26	1.39	1.04	1.30	1.55	1.46	1.30	1.17	1.34	1.20	1.23	1.13	1.34
Switzerland	1.59	1.73	1.38	1.64	1.88	1.80	1.64	1.51	1.68	1.54	1.57	1.47	1.68
U.K.	0.73	0.86	0.51	0.77	1.02	0.93	0.77	0.64	0.81	0.67	0.70	0.60	0.81
U.S.A	0.63	0.77	0.42	0.67	0.92	0.84	0.68	0.54	0.72	0.58	0.61	0.51	0.72
Brazil (E)	2.80	2.94	2.59	2.84	3.09	3.01	2.85	2.71	2.88	2.75	2.78	2.68	2.89
China (E)	0.34	0.47	0.12	0.38	0.63	0.54	0.38	0.25	0.42	0.28	0.31	0.21	0.42
India (E)	0.99	1.13	0.77	1.03	1.28	1.20	1.04	0.90	1.07	0.93	0.96	0.87	1.08
Malaysia (E)	0.75	0.88	0.53	0.79	1.03	0.95	0.79	0.66	0.83	0.69	0.72	0.62	0.83
Mexico (E)	1.46	1.60	1.24	1.50	1.75	1.67	1.51	1.37	1.54	1.40	1.43	1.34	1.55
Philippines (E)	1.47	1.60	1.25	1.51	1.76	1.67	1.51	1.38	1.55	1.41	1.44	1.34	1.55
Poland (E)	0.82	0.96	0.61	0.86	1.11	1.03	0.87	0.73	0.90	0.77	0.80	0.70	0.91
South Africa (E)	0.87	1.01	0.66	0.91	1.16	1.08	0.92	0.78	0.95	0.82	0.85	0.75	0.96
South Korea (E)	1.52	1.66	1.31	1.56	1.81	1.73	1.57	1.43	1.60	1.47	1.50	1.40	1.61
Taiwan (E)	0.65	0.79	0.44	0.70	0.94	0.86	0.70	0.57	0.74	0.60	0.63	0.53	0.74
Turkey (E)	0.55	0.69	0.34	0.60	0.84	0.76	0.60	0.46	0.64	0.50	0.53	0.43	0.64
Dev. S.D.	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28
Emg. S.D.	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68
All S.D.	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45

effect. Take a construction company in Singapore for example. The warranted BM equals 1.05, which is the sum of the world average BM, the Singapore pure country effect, and the construction industry pure effect (0.86+0.05+0.14). This warranted BM ratio denotes the BM coming from only world, country and industry effects. It is different from the time series average of the country and industry valuation ratios in that it does not take into account the average idiosyncratic firm component.[24],[25]

4.2 Predictability of Future Returns

Previous literature (Fama and French (1998); Liew and Vassalou (2001); Asness, Moskowitz, and Pedersen (2009)) documents that value premium exists internationally. We are interested in whether there is returns predictability from country-, industry-, and idiosyncratic firm-level valuation ratios. Equation (1) shows individual firm's idiosyncratic component is firm BM minus those estimated coefficients. Thus, we clearly decompose firm BM into four components. Table 3.5 provides evidence on predictability of excess returns based on valuation ratios, and attributed such predictability to world, country and industry adjustment components.

Table 3.5 Panel A first shows the sorting results based on BM and EP ratios. For BM portfolios, the most recent fiscal yearend BM in the calendar year t-1 is used for the portfolio formation from July in year t to June in year

[24] Recall from equation (1) that each firm's BM ratio equals the sum of world, country, industry, and an idiosyncratic firm component.
[25] This table also provides another practical benefit. It gives estimates of the country-industry mean valuation ratios when a given industry does not exist in a country. For instance, there is no firm in the paper industry in Singapore, but one can estimate such a ratio using pure country and pure industry estimates from the dummy variable regressions.

t+1. Thus, we ensure that BM is known before returns. Other sorting tables follow the same rule.

P5 represents the portfolio with the highest quintile of valuation ratio, while P1 represents the portfolio with the lowest valuation ratio. We then track the subsequent six-month, 1-year, 2-year and 3-year ahead CAPM risk-adjusted returns on these quintile portfolios. The CAPM risk-adjusted returns are residuals from time-series regressions of individual stock returns on world market returns. P5-P1 row shows the returns differentials between the portfolios with the highest quintile and the lowest quintile valuation ratios.

We find that firms in the highest quintile BM portfolio have significantly more positive returns compared to firms in the lowest BM. Over the next 4 quarters, firms with high BM have on average 1.7% to 2.2% higher quarterly returns than firms with low BM. The one-year total returns difference is 6.93% with a t-statistics of 2. The two-year and three-year returns difference are also positive although only the three-year returns is statistically significant. The empirical evidence on EP portfolio is similar. Low EP portfolios have higher subsequent returns although the difference is only statistical significant for the next two quarters.

Such empirical evidence is similar to previous empirical evidence that value firms outperform growth firms across the world.[26] However, it also brings questions whether the return predictability of BM comes from country, industry and firm idiosyncratic effects on the valuation ratio.

[26] International value premium has been studied in countries outside the U.S. in Fama and French (1998), Liew and Vassalou (2000) and Asness, Moskowitiz and Pedersen (2009). Moreover, Asness, Liew, and Stevens (1997) and Asness, Moskowitz and Pedersen (2009) report that value premium is found in other classes such as country indices.

Table 3.5 Panels B document the sorting results based on country, industry and firm idiosyncratic BM. We sort firms into portfolios based on country pure BM we estimated in Tables 3.3 and 3.4. While firms with high country BM tend to have somewhat higher returns than firms with low country BM, the difference is not statistically significant. Similarly, we cannot find statistically significant difference between firms with high industry BM vs low industry BM.

When we sort firms based on firm idiosyncratic BM, we find firms with high idiosyncratic BM have substantially higher returns than firms with low idiosyncratic BM. Over the next two years, the returns difference between the P5 and P1 quintile is 5.63% and 5.67%, with a t-statistic of 2.48 and 2.72. The Sharpe ratios are 0.5 and 0.6.

Table 3.5 Panels C document the sorting results based on country, industry and firm idiosyncratic EP. Again, we find that country and industry do not have significant predictability towards future returns, while firm with idiosyncratic EP does predict future returns. Table 3.6 provides regression results on country, industry and firm idiosyncratic valuation ratios. We regress future six-month, 1-year and 2-year returns on pure country BM, pure industry BM and firm idiosyncratic BM based on Fama-McBeth (1987) methodology. We control for momentum (past 6-month returns of the stock excluding the past month) and log firm size in the regression.

Table 3.6 confirms that stock return predictability mainly comes from firm idiosyncratic BM. The coefficients on pure country BM and pure industry BM on the six-month returns are not significant, while the coefficient on idiosyncratic firm BM is positive with a t-statistic of 3. One standard deviation increases in idiosyncratic BM leads to a 0.7% increase in returns over the next

Table 3.5: Subsequent Returns for Portfolios

This table shows the predictability of individual firm multiples for monthly stock returns portfolios. Returns are adjusted using world CAPM (WCAPM) model. Panel A is sorting results based on BM and EP. For sorting, portfolios are formed based on individual firm's BM(or EP) every year. P1 is the lowest value of portfolios. P5-P1 is the portfolio return differences, the highest minus the lowest. Numbers in parenthesis are Newey-West (1989) t-statistics with 11 month lags. Returns are in percentage. Sharpe ratio is the mean over the standard deviation of portfolio returns. Qtr1-Qtr4 columns indicate one - four quarters ahead returns. Year1-Year3 columns indicates one-three years ahead returns. Panel B and C are sorting results based on three components of BM and EP. Three components are country adjustment, industry adjustment and idiosyncratic firm level components. All other notations follows the similar rule in Panel A.

				Sorted by BM				
Portfolio	Mean	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Year 1	Year 2	Year 3
P1	0.20	-0.97	-1.48	-1.68	-1.58	-5.16	-4.66	-4.79
		(-2.86)	(-4.32)	(-4.87)	(-4.42)	(-2.83)	(-2.45)	(-2.49)
P3	0.63	-0.14	-0.54	-0.80	-0.62	-2.27	-1.77	-2.10
		(-0.48)	(-1.98)	(-3.00)	(-2.23)	(-2.69)	(-2.08)	(-2.11)
P5	1.84	1.19	0.46	0.08	0.10	1.77	1.11	2.42
		(2.11)	(0.88)	(0.15)	(0.21)	(0.92)	(0.61)	(1.18)
P5-P1		2.16	1.93	1.76	1.68	6.93	5.76	7.21
		(2.65)	(2.44)	(2.22)	(2.21)	(2.00)	(1.73)	(2.00)
Sharpe Ratio						0.42	0.37	0.46
				Sorted by EP				
Portfolio	Mean	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Year 1	Year 2	Year 3
P1	0.02	-1.42	-2.03	-2.19	-2.20	-7.24	-6.63	-6.37
		(-2.73)	(-3.86)	(-4.12)	(-4.02)	(-3.13)	(-2.38)	(-2.27)
P3	0.06	-0.01	-0.29	-0.60	-0.59	-1.43	-2.48	-2.43
		(-0.04)	(-0.88)	(-1.89)	(-2.04)	(-1.04)	(-2.07)	(-2.11)
P5	0.17	0.57	0.04	-0.50	-0.47	-0.74	-1.30	-0.47
		(1.17)	(0.08)	(-1.05)	(-1.00)	(-0.44)	(-0.74)	(-0.28)
P5-P1		1.99	2.07	1.69	1.73	6.51	5.33	5.90
		(2.25)	(2.33)	(1.86)	(1.87)	(1.85)	(1.34)	(1.62)
Sharpe Ratio						0.37	0.28	0.34

Table 3.5 (continued)

Panel B: BM Decomposition

Portfolio	Mean	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Year 1	Year 2	Year 3
Sorted by Country adjustment								
P1	-0.33	-0.88	-1.15	-1.35	-1.41	-4.13	-5.77	-5.55
		(-1.53)	(-1.99)	(-2.19)	(-2.13)	(-1.67)	(-2.21)	(-2.06)
P3	-0.07	-0.01	-0.14	-1.05	-1.45	-2.57	-4.87	-1.24
		(-0.03)	(-0.29)	(-2.23)	(-3.08)	(-2.30)	(-3.27)	(-0.80)
P5	0.63	-0.25	-0.73	-0.99	-1.02	-2.35	-2.32	-1.80
		(-0.53)	(-1.63)	(-2.16)	(-2.26)	(-2.05)	(-2.22)	(-1.42)
P5-P1		0.63	0.41	0.37	0.40	1.55	3.29	3.60
		(0.71)	(0.47)	(0.40)	(0.43)	(0.51)	(1.13)	(1.10)
Sharpe Ratio						0.09	0.21	0.22
Sorted by Industry adjustment								
Portfolio	Mean	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Year 1	Year 2	Year 3
P1	-0.21	-0.97	-1.41	-1.71	-1.68	-5.20	-5.73	-4.62
		(-2.28)	(-3.28)	(-4.16)	(-4.10)	(-2.11)	(-2.56)	(-1.94)
P3	0.03	-0.35	-0.57	-0.86	-0.84	-2.64	-3.08	-2.79
		(-1.27)	(-2.09)	(-3.10)	(-3.11)	(-2.62)	(-2.54)	(-1.90)
P5	0.21	-0.47	-0.95	-1.17	-0.91	-3.75	-2.68	-5.27
		(-0.73)	(-1.56)	(-1.93)	(-1.56)	(-1.87)	(-1.16)	(-1.85)
P5-P1		0.87	0.82	0.89	1.07	2.79	4.35	0.85
		(0.91)	(0.87)	(0.95)	(1.19)	(0.67)	(1.10)	(0.19)
Sharpe Ratio						0.15	0.25	0.05
Sorted by Firm idiosyncratic factor (BM-world-country-industry)								
Portfolio	Mean	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Year 1	Year 2	Year 3
P1	-0.65	-0.82	-1.17	-1.50	-1.51	-4.74	-5.22	-3.74
		(-2.66)	(-3.78)	(-4.69)	(-4.68)	(-3.74)	(-4.58)	(-2.43)
P3	-0.12	-0.72	-1.19	-1.46	-1.41	-4.50	-4.27	-4.58
		(-2.35)	(-4.36)	(-5.33)	(-4.80)	(-3.99)	(-3.36)	(-2.97)
P5	0.70	0.69	0.33	-0.02	-0.02	0.89	0.44	0.11
		(1.65)	(0.84)	(-0.06)	(-0.04)	(0.60)	(0.33)	(0.06)
P5-P1		1.51	1.50	1.48	1.49	5.63	5.67	3.85
		(3.03)	(3.10)	(3.08)	(3.22)	(2.48)	(2.72)	(1.48)
Sharpe Ratio						0.52	0.60	0.36

Table 3.5 (continued)

Panel C: EP Decomposition

Portfolio	Mean	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Year 1	Year 2	Year 3
Sorted by Country adjustment								
P1	-0.04	-1.13	-1.56	-1.37	-1.14	-4.58	-3.16	-4.06
		(-1.63)	(-2.24)	(-1.87)	(-1.53)	(-1.66)	(-0.91)	(-1.19)
P3	0.00	-0.93	-0.73	-0.69	-0.53	-2.45	-4.65	-3.48
		(-1.84)	(-1.33)	(-1.25)	(-0.97)	(-1.67)	(-2.66)	(-2.64)
P5	0.06	-0.30	-0.75	-1.04	-0.99	-2.46	-3.59	-2.75
		(-0.68)	(-1.85)	(-2.45)	(-2.41)	(-2.29)	(-3.45)	(-2.22)
P5-P1		0.83	0.82	0.34	0.15	1.91	-0.43	1.30
		(0.88)	(0.89)	(0.34)	(0.15)	(0.58)	(-0.11)	(0.36)
Sharpe Ratio						0.11	-0.02	0.08
Sorted by Industry adjustment								
Portfolio	Mean	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Year 1	Year 2	Year 3
P1	-0.02	-1.22	-1.54	-1.68	-1.46	-5.27	-4.98	-5.26
		(-3.44)	(-4.41)	(-4.88)	(-4.23)	(-2.54)	(-2.41)	(-2.70)
P3	0.00	-0.29	-0.76	-0.83	-0.77	-2.62	-3.43	-3.67
		(-0.74)	(-2.03)	(-2.19)	(-2.00)	(-1.97)	(-2.40)	(-3.01)
P5	0.02	-1.06	-1.21	-1.20	-0.96	-4.38	-2.75	-1.10
		(-2.18)	(-2.45)	(-2.41)	(-1.90)	(-2.57)	(-1.31)	(-0.60)
P5-P1		0.34	0.50	0.62	0.64	1.44	2.59	4.12
		(0.48)	(0.70)	(0.89)	(0.90)	(0.42)	(0.74)	(1.40)
Sharpe Ratio						0.09	0.17	0.31
Sorted by Firm idiosyncratic factor (EP-world-country-industry)								
Portfolio	Mean	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Year 1	Year 2	Year 3
P1	-0.06	-0.70	-1.14	-1.35	-1.22	-3.56	-4.96	-3.93
		(-2.30)	(-3.93)	(-4.46)	(-4.13)	(-3.03)	(-4.09)	(-2.91)
P3	-0.01	-0.46	-0.98	-1.13	-1.04	-3.44	-3.66	-3.74
		(-1.58)	(-4.11)	(-4.56)	(-3.76)	(-3.12)	(-2.98)	(-2.87)
P5	0.07	0.30	-0.14	-0.57	-0.42	-1.02	-0.96	-1.91
		(0.80)	(-0.40)	(-1.67)	(-1.23)	(-0.98)	(-0.97)	(-1.68)
P5-P1		1.00	1.01	0.78	0.80	2.54	4.01	2.02
		(2.39)	(2.46)	(1.92)	(2.05)	(1.75)	(3.31)	(1.37)
Sharpe Ratio						0.31	0.56	0.28

Table 3.6: Fama-MacBeth Return Regressions

This table reports Fama-MacBeth (1973) return regression results with Newey-West (1989) autocorrelation corrected t-statistics. The dependent variable is future returns for next 6 months from reg1 to reg5 and future returns for next one/two years for reg5/reg6. Independent variables are following. Country and industry adjustment coefficients are estimated from Table 3.4. Idiosyncratic factor is firm level valuation ratio minus world/country/industry adjustment coefficients from Table 4. Momentum is the past size months' return excluding the most recent month. Adjustments and firm idiosyncratic variables are standardized. Log(Size) is the U.S. market value at the last day of that month. Data frequency is annual and the standard month is June every year. Numbers in parenthesis are Newey-West (1989) t-statistics with one year lag. Returns are world CAPM adjusted returns using world market returns.

	BM						EP					
Dependent Vars.	6 month	6 month	6 month	6 month	Year 1	Year 2	6 month	6 month	6 month	6 month	Year 1	Year 2
Specifications	reg1	reg2	reg3	reg4	reg5	reg6	reg1	reg2	reg3	reg4	reg5	reg6
Country Adjustment	0.010			0.010	0.007	0.000	0.026			0.026	0.001	-0.011
	(1.18)			(1.24)	(0.45)	(0.02)	(2.67)			(2.61)	(0.04)	(-0.48)
Industry Adjustment		0.002		0.002	0.003	0.006		0.001		0.000	0.005	0.008
		(0.41)		(0.26)	(0.41)	(0.61)		(0.21)		(-0.07)	(0.77)	(0.90)
Idiosyncratic Factor			0.007	0.007	0.018	0.017			0.002	0.003	0.006	0.003
			(3.24)	(2.97)	(3.39)	(2.87)			(1.72)	(1.85)	(1.54)	(1.06)
Momentum	0.037	0.037	0.035	0.034	-0.026	-0.088	0.049	0.037	0.037	0.048	-0.004	-0.083
	(2.25)	(1.71)	(1.65)	(2.01)	(-0.85)	(-2.31)	(3.38)	(1.72)	(1.73)	(3.37)	(-0.13)	(-2.70)
Log(Size)	-0.003	-0.004	-0.003	-0.002	-0.013	-0.009	-0.001	-0.004	-0.004	-0.001	-0.015	-0.012
	(-1.19)	(-1.30)	(-1.08)	(-0.82)	(-4.00)	(-2.10)	(-0.53)	(-1.35)	(-1.27)	(-0.49)	(-4.37)	(-2.94)
Adjusted R-square	0.030	0.021	0.017	0.036	0.049	0.050	0.050	0.020	0.017	0.054	0.058	0.062
No. of avg. Firm Obs.	8697	8697	8697	8697	8406	7251	8697	8697	8697	8697	8406	7251

six months. Similarly, idiosyncratic firm BM predicts returns in years 1 and 2. Regression results for EP on idiosyncratic EP are weaker across the board with a more marginal t-statistic of 1.7 to 1.8. Country EP shows some statistical significance over the next six months but not after 1 year.

Overall, the empirical evidence we have seen in Tables 3.5 and 3.6 shows that the returns predictability comes from firm idiosyncratic component of BM ratio. While country- or industry-wide level of BM do not necessarily predict higher subsequent returns, firms with high BM relative to their country and industry average tend to perform better over the next two years. This points to the importance of a value strategy based on firm idiosyncratic BM. Our results show that country adjustment (that can be explained by country characteristics) in BM has little predictability, which support Asness et al. (2009) findings that value premia across countries exists and are positively related even with the presence of common underlying economic factors.

5. Time-Series Variation of Firm Valuation Ratios

Fama and French (2007a, 2007b) show that migration in terms of BM ratios of stocks contributes to value premiums in the average returns.[27] Migration points to the importance of understanding the time variation in BM. To understand this time variation of BM, we decompose the firm level BM into country-, industry-, and firm-level variations.

We begin by equation (1) which rules out any interaction between industry and country effects. Thus, time-series variance of BM for a firm, i, is

[27] Value stocks that do not migrate have higher average returns than growth stocks that do not migrate. Similarly, value stocks that move toward growth have higher average returns and growth stocks that move toward value have lower average returns.

the sum of variances of each component as the covariances equal zero.

$$\begin{aligned} BM_{i,t} &= \alpha_t + \beta_{j,t} + \gamma_{k,t} + e_{i,t} \\ \mathrm{var}(BM_{i,t}) &= \mathrm{var}(\alpha_t + \beta_{j,t} + \gamma_{k,t} + e_{i,t}) \\ &= \mathrm{var}(\alpha_t) + \mathrm{var}(\beta_{j,t}) + \mathrm{var}(\gamma_{k,t}) + \mathrm{var}(e_{i,t}) \end{aligned} \tag{4}$$

The proportions of a firm variance of BM ratio explained by world, country, industry and firm disturbance are expressed as follows:

$$ratio\_wld = \frac{\mathrm{var}(\alpha_t)}{\mathrm{var}(BM_{i,t})},\ ratio\_cty = \frac{\mathrm{var}(\beta_{j,t})}{\mathrm{var}(BM_{i,t})},$$
$$ratio\_ind = \frac{\mathrm{var}(\gamma_{k,t})}{\mathrm{var}(BM_{i,t})} \quad \text{nd } ratio\_firm = \frac{\mathrm{var}(e_{i,t})}{\mathrm{var}(BM_{i,t})} \tag{5}$$

5.1 Decomposition of Variation

Table 3.7 provides decomposition of variation. The table first shows the total variance of BM, $\mathrm{var}(BM_{i,t})$. Then we show the four components as a proportion of the total variance: ratio_wld, ratio_cty, ratio_ind, and ratio_firm. The variance is calculated over annual observations of the valuation ratios. For each firm, we require a minimum number of five years over time to calculate variance across time.

Table 3.7 Panel A shows that Brazil has the largest time-series variance in BM among all countries, while the United States and Netherland have the lowest variance. In terms of the proportion of the variance being explained, the United Kingdom has the smallest country proportion of variation. There, the country level BM accounts for only 10% of the firms' total variance. China has the largest country proportion of variation. Chinese country level BM accounts for 56% of the firms' total variance while the firm level idiosyncratic BM only accounts for 18% of the total variance. Interestingly, across the border in Hong

Table 3.7: Time Series Variance of Valuation Ratios and Decompositions

This table summarizes firm time-series variances and decomposition of these variances into country, industry, firm idiosyncratic and world by country (Panel A) or by industry (Panel B). The sample period is 01/01/1990-12/31/2006 and the data covers 33 countries. Total variance of BM for each individual firm is calculated with for at least five years time period. The reported number is the average of individual firm's BM variances and the total number of firms used for each country is reported in the first column. Ratios are the proportion of world (Wld.), country (Cty.), industry (Ind.), firm idiosyncratic (Firm) component among the total variance for each individual firm and report the average across firms. The sum of four components equals one. EP also follows similar rule and for reporting purpose, Total EP variance is multiplied by 100.

Panel A: By Country

Country	# of Firms	BM					EP				
		Total BM Variance	Ratios				Total EP Variance	Ratios			
			Cty.	Ind.	Idio.	Wld.		Cty.	Ind.	Idio.	Wld.
Australia	236	0.10	11%	6%	64%	18%	0.18	7%	5%	80%	8%
Austria	82	0.77	32%	2%	61%	5%	1.04	23%	1%	72%	3%
Belgium	89	0.24	40%	3%	48%	9%	0.78	20%	1%	75%	3%
Canada	344	0.28	19%	6%	63%	12%	0.54	13%	4%	78%	5%
Denmark	179	0.32	26%	3%	63%	9%	0.53	12%	2%	84%	3%
Finland	88	0.74	33%	3%	57%	7%	0.79	22%	1%	75%	2%
France	507	0.19	27%	4%	58%	11%	0.43	13%	4%	78%	6%
Germany	426	0.23	21%	6%	59%	14%	0.47	13%	4%	76%	7%
Greece	132	0.61	51%	2%	43%	4%	0.70	53%	1%	44%	1%
Hong Kong	262	0.60	17%	2%	76%	5%	0.71	6%	2%	89%	3%
Italy	214	0.85	43%	2%	53%	3%	0.83	26%	2%	69%	3%
Japan	1,843	0.19	41%	4%	47%	8%	0.08	26%	7%	56%	11%
Netherlands	158	0.09	33%	5%	49%	13%	0.13	20%	4%	68%	7%
New Zealand	35	0.10	20%	5%	53%	22%	0.11	8%	6%	79%	8%
Norway	98	0.38	34%	2%	59%	5%	1.03	17%	2%	80%	2%
Portugal	50	0.34	18%	4%	69%	8%	0.44	16%	3%	77%	4%
Singapore	141	0.23	28%	2%	62%	8%	0.16	13%	4%	77%	7%
Spain	133	0.21	35%	4%	52%	10%	0.24	21%	4%	69%	6%
Sweden	157	0.60	35%	3%	54%	8%	1.36	22%	1%	74%	2%
Switzerland	196	1.13	38%	1%	58%	3%	0.85	23%	2%	73%	3%
United Kingdom	1,137	0.14	10%	6%	70%	14%	0.20	8%	4%	80%	8%
United States	2,773	0.09	19%	6%	57%	17%	0.12	12%	5%	73%	10%
Brazil (E)	49	2.03	28%	1%	70%	1%	2.10	17%	1%	81%	1%
China (E)	33	0.08	56%	7%	18%	19%	0.07	46%	9%	36%	10%
India (E)	202	0.94	33%	2%	63%	3%	0.74	28%	1%	69%	2%
Malaysia (E)	288	0.28	29%	3%	62%	6%	0.26	18%	3%	75%	4%
Mexico (E)	48	0.76	15%	3%	77%	5%	1.29	14%	2%	83%	2%
Philippines (E)	51	1.16	35%	1%	61%	3%	0.85	27%	2%	70%	2%
Poland (E)	26	0.12	30%	3%	55%	12%	0.22	36%	2%	59%	3%
South Africa (E)	189	0.27	11%	5%	75%	9%	0.57	22%	2%	74%	2%
South Korea (E)	246	1.22	30%	1%	67%	2%	1.18	29%	1%	68%	1%
Taiwan (E)	157	0.17	31%	7%	50%	12%	0.09	18%	6%	66%	9%
Turkey (E)	76	0.21	40%	4%	46%	10%	0.90	39%	1%	59%	1%
Dev. Mean	9,280	0.38	29%	4%	58%	10%	0.53	18%	3%	74%	5%
Emg. Mean	1,365	0.66	31%	3%	58%	8%	0.75	27%	3%	67%	3%
All Mean	10,645	0.48	29%	4%	58%	9%	0.61	21%	3%	72%	4%

Table 3.7 (continued)

Panel B: By Industry

Industry	# of Firms	BM					EP				
		Total BM Variance	Ratios				Total EP Variance	Ratios			
			Cty.	Ind.	Idio.	Wld.		Cty.	Ind.	Idio.	Wld.
Beer	103	0.31	24%	6%	58%	12%	0.25	20%	5%	67%	9%
Games	188	0.23	24%	2%	63%	11%	0.26	17%	4%	72%	8%
Books	164	0.18	27%	5%	54%	14%	0.26	17%	2%	73%	8%
Hshld	216	0.26	29%	2%	57%	12%	0.29	18%	3%	71%	8%
Cnstr	847	0.35	25%	9%	58%	8%	0.39	17%	4%	73%	6%
Util	282	0.29	31%	5%	51%	13%	0.29	21%	5%	65%	9%
Telcm	142	0.39	21%	18%	54%	8%	0.46	15%	17%	63%	5%
Servs	656	0.18	22%	4%	59%	15%	0.24	16%	4%	71%	9%
BusEq	620	0.17	26%	11%	52%	11%	0.24	17%	6%	68%	9%
Trans	351	0.36	26%	5%	59%	11%	0.49	15%	6%	73%	6%
Whlsl	691	0.26	25%	2%	63%	10%	0.32	17%	1%	74%	7%
Rtail	581	0.27	23%	2%	64%	12%	0.25	18%	1%	72%	9%
Meals	221	0.26	23%	2%	64%	11%	0.24	17%	6%	69%	9%
Fin	2,224	0.28	26%	1%	58%	14%	0.38	17%	2%	73%	8%
Food (T)	433	0.29	31%	2%	55%	11%	0.37	19%	3%	71%	7%
Clths (T)	122	0.31	17%	9%	66%	8%	0.40	13%	6%	75%	6%
Hlth (T)	374	0.20	27%	5%	54%	14%	0.24	20%	3%	68%	10%
Chems (T)	342	0.38	30%	6%	55%	9%	0.37	22%	4%	66%	8%
Txtls (T)	162	0.57	22%	13%	60%	5%	0.47	18%	7%	70%	4%
Steel (T)	269	0.53	29%	4%	60%	7%	0.49	18%	9%	69%	5%
FabPr (T)	498	0.30	29%	3%	58%	10%	0.34	18%	3%	71%	8%
ElcEq (T)	173	0.24	28%	4%	57%	11%	0.20	21%	2%	67%	10%
Autos (T)	288	0.34	30%	5%	56%	9%	0.39	18%	8%	69%	5%
Carry (T)	74	0.22	27%	3%	60%	11%	0.30	14%	7%	74%	6%
Mines (T)	128	0.20	16%	16%	60%	8%	0.32	14%	10%	72%	4%
Oil (T)	227	0.16	26%	4%	56%	13%	0.32	13%	11%	71%	5%
Paper (T)	269	0.28	27%	8%	56%	9%	0.55	13%	9%	73%	5%
Nontraded. Mean	7,286	0.27	25%	5%	58%	12%	0.31	17%	5%	70%	8%
Traded. Mean	3,359	0.31	26%	6%	58%	10%	0.37	17%	6%	70%	6%
All Mean	10,645	0.29	26%	6%	58%	11%	0.34	17%	5%	70%	7%

Kong, the country level variance is only 17%, while the firm level BM variation accounts for 76% of the firm level variance. For all countries, industry accounts for less than ten percent of the variations in the firms' total variance. Table 3.7 Panel B reports the four variance components for different industries. Again, industry accounts for less than ten percent of the variations in the firms' total variance.

Our country-component of valuation ratio is related to market synchronicity introduced in Morck, Yeung and Yu (2000), Durnev, Morckm Yeung and Zarowin (2003), Durnev, Morck and Yeung (2004) and Jin and Myers (2006).

5.2 What Drives Country- and Firm-component of Firm Variance?

Table 3.8 relates firm idiosyncratic and country component of variances to country and firm level factors. The dependent variables are the ratio of firm idiosyncratic risk to firm BM variance, as well as the ratio of country risk to firm BM variance. The firm-level factors that we examine include illiquidity, return volatility, total BM (or EP) variance, earnings forecasts dispersion, number of analysts, O-score, and leverage.[28] Detailed definitions of the explanatory variables are provided in Table A3.2. Our illiquidity measure is the percentage of trading days with zero returns given a month as in Bekaert, Harvey and Lunblad (2007). We transform monthly illiquidity measure by averaging previous 12 months values to yearly illiquidity measure. We expect that the proportion of firm idiosyncratic variation the firm level is high when stocks are illiquid.[29] Return volatility

[28] Altman (1968) Z-Score has been also reviewed in the analysis and we only reports O-score results.
[29] Asness, Moskowitz and Pedersen (2009) show that value premium is positively related to liquidity risk.

based on last twelve month and firm Total BM variance are also expected to be positively related to high proportion of firm idiosyncratic variation. Earnings forecast dispersion and the number of analysts are proxies for information uncertainty as proposed by Jiang, Lee and Zhang (2005) and Zhang (2005). We employ these variables as we expect that firms with higher information uncertainty have higher proportion by firm idiosyncratic variation. To control for the effect of firm-level default risk, we use O-score (Ohlson (1980)) and Book Leverage.

The country-level factors include common law, political stability, synchronicity, capital account openness, real GDP growth and inflation. La Porta et al. (1998) show that countries following the common law system provide better governance. We expect that country level variation counts for more in countries with poorer governance. Countries with more political more stability, more efficient stock market (lower synchronicity), and higher capital account openness should have less country-level influence on BM variation. We use real GDP growth and inflation as control variables.

Table 3.8 shows that illiquidity increases the firm idiosyncratic proportion in the variance of BM in univariate regression as well as in multivariate regression with various control variables. Both Return volatility and Total BM variance increase the firm idiosyncratic portion, although return volatility is marginally insignificant in specification 2. Earnings forecast dispersion increases firm idiosyncratic portion.

In the right half of Panel A, we regress the country portion of the variance on various country characteristics. Common law (which proxies for better governance), political stability and better capital openness significantly decrease the country portion of firm BM variance. Lower synchronicity i.e.

Table 3.8: What Drives Firm/Country Components of Firm Variance?

This table presents two-dimension (country/industry) cluster regressions using country component over firm variance as well as firm idiosyncratic component over firm variance. Total BM (or EP) Variance is firm variance of BM (or EP). Independent variables consist of country-level and firm-level variables. Country-level variables are followings: Common law, capital account, political stability, GDPg and inflation. Firm level variables are followings: Illiquidity, Return volatility, No of analysts, Earnings Forecasts Dispersion, O-score, Profit Margin, ROE and Book Leverage. All values are time-series average for cross-sectional regression.

Panel A: BM

	Dep. Var.: VAR(Firm Idiosyncratic)/VAR(Firm BM)							Dep. Var.: VAR(Country)/VAR(Firm BM)						
	reg1	reg2	reg3	reg4	reg5	reg6	reg7	reg1	reg2	reg3	reg4	reg5	reg6	reg7
Illiquidity	0.26			0.32	0.36	0.24	0.23						-0.18	-0.12
	(5.24)			(5.02)	(4.93)	(4.72)	(4.82)						(-4.55)	(-2.23)
Return Volatility		2.40		4.26	2.92	2.60	2.80						-2.57	-1.52
		(1.72)		(3.61)	(2.44)	(2.54)	(2.94)						(-2.93)	(-1.46)
Total BM Variance		0.12		0.12	0.12	0.13	0.13						-0.08	-0.09
		(5.71)		(5.18)	(5.29)	(5.51)	(5.28)						(-5.00)	(-5.03)
Earnings Forecasts Dispersion			4.13	1.22	2.42	3.38	3.61						-2.24	-2.73
			(5.93)	(2.15)	(3.60)	(6.16)	(7.04)						(-5.26)	(-4.23)
No of Analysts			0.00	0.00	0.00	0.00	0.00						0.00	0.00
			(-2.18)	(-0.15)	(1.72)	(1.58)	(1.61)						(-0.42)	(-1.53)
O-score					0.01	0.00	0.00							-0.01
					(0.79)	(-0.24)	(-0.18)							(-1.50)
Book Leverage					-0.05	-0.03	-0.03							0.07
					(-1.36)	(-0.89)	(-0.84)							(2.93)
Common Law						0.10	0.11	-0.18				-0.16	-0.16	-0.16
						(5.06)	(5.80)	(-5.30)				(-3.73)	(-4.11)	(-5.14)
Political Stability						0.01	0.00		-0.05			-0.03	-0.08	-0.07
						(0.24)	(-0.01)		(-1.95)			(-1.23)	(-2.21)	(-1.75)
Synchronicity						-0.34	-0.27			0.56		0.07	0.44	0.67
						(-1.98)	(-1.60)			(3.23)		(0.29)	(1.97)	(2.76)
Capital Acct Openness						-0.02	-0.01				-0.32	-0.08	0.10	0.13
						(-0.18)	(-0.05)				(-1.91)	(-0.49)	(0.60)	(0.87)
GDPg							-1.33					0.10	0.61	0.85
							(-1.80)					(0.09)	(0.66)	(0.82)
Inflation							2.38					-2.09	-3.19	-4.51
							(2.79)					(-1.05)	(-1.65)	(-3.22)
Adjusted R-square	0.06	0.13	0.05	0.18	0.23	0.27	0.28	0.21	0.02	0.10	0.07	0.24	0.39	0.39
No. of Firms	10645	10645	7017	7017	4319	4053	4053	10645	10383	10645	10488	10226	6699	4053

Table 3.8 (continued)

Panel B: EP

	Dep. Var. : VAR(Firm Idiosyncratic)/VAR(Firm EP)							Dep. Var. : VAR(Country)/VAR(Firm EP)						
	reg1	reg2	reg3	reg4	reg5	reg6	reg7	reg1	reg2	reg3	reg4	reg5	reg6	reg7
Illiquidity	0.23			0.23	0.23	0.09	0.09						-0.11	-0.05
	(4.89)			(2.75)	(3.58)	(2.44)	(2.49)						(-3.05)	(-1.26)
Return Volatility		-0.33		1.12	0.06	0.10	0.27						-0.32	0.30
		(-0.26)		(1.04)	(0.04)	(0.10)	(0.28)						(-0.39)	(0.27)
Total EP Variance		8.90		9.40	8.73	10.27	10.34						-6.80	-6.30
		(6.81)		(5.70)	(7.46)	(7.81)	(7.59)						(-6.99)	(-6.82)
Earnings Forecasts Dispersion			4.77	2.42	4.30	5.37	5.48						-3.26	-3.30
			(4.20)	(2.07)	(5.15)	(8.86)	(9.17)						(-6.27)	(-5.89)
No of Analysts			0.00	0.00	0.00	0.00	0.00						0.00	0.00
			(-0.85)	(0.49)	(1.79)	(1.17)	(1.08)						(-0.86)	(-1.16)
O-score					0.03	0.02	0.02							-0.01
					(3.36)	(4.95)	(5.04)							(-2.27)
Book Leverage					-0.07	-0.05	-0.04							0.03
					(-2.56)	(-2.49)	(-2.37)							(1.70)
Common Law						0.11	0.10	-0.11				-0.09	-0.12	-0.12
						(4.73)	(4.25)	(-4.70)				(-2.88)	(-3.50)	(-3.97)
Political Stability						0.08	0.07		-0.06			-0.03	-0.07	-0.08
						(2.60)	(2.38)		(-5.33)			(-1.74)	(-2.30)	(-2.54)
Synchronicity						-0.42	-0.44			0.42		0.08	0.34	0.45
						(-1.53)	(-1.70)			(3.07)		(0.43)	(1.50)	(1.56)
Capital Acct Openness						-0.07	-0.07				-0.32	-0.12	0.00	0.08
						(-0.47)	(-0.45)				(-3.81)	(-1.00)	(0.02)	(0.47)
GDPg							-0.21					1.28	1.78	2.15
							(-0.27)					(1.50)	(1.82)	(2.21)
Inflation							3.40					-1.70	-2.52	-2.76
							(2.35)					(-1.11)	(-1.48)	(-1.72)
Adjusted R-square	0.06	0.12	0.05	0.16	0.27	0.37	0.37	0.13	0.04	0.09	0.11	0.20	0.37	0.38
No. of Firms	10645	10645	7017	7017	4319	4053	4053	10645	10383	10645	10488	10226	6699	4053

higher market efficiency is associated with an increase in the country portion of BM variance.

Overall, Table 3.8 shows that firms that have high variance of valuation ratios, high illiquidity and high information uncertainty tend to have higher firm idiosyncratic portion, while firms in countries with better governance, political stability, and capital openness tend to have lower country portion of valuation variance.

6. Robustness Checks

6.1. Value-weighted Indices

All our results so far examine equal-weighted valuation ratios. One issue is whether the value-weighted valuation ratios would be different. To examine this possibility, we conduct robustness checks by redoing all our tables based on value-weighted valuation ratios instead of equal-weighted valuation ratios.

Table 3.9 summarizes the value-weighted analysis for previous Table 3.2, Table 3.3, Table 3.5 and Table 3.7. Overall, the value-weighted analysis provides similar results to equal-weighted analysis. Panel A shows that value-weighted country and industry average statistically significantly explain firm valuation ratios (VR). Panel B confirms that value-weighted method also provides similar adjustment coefficients and similar standard deviation of country and industry adjustment coefficients across countries (or across industries). The last column, pure industry S.D./pure country S.D., shows that industry variation is less than country variation. Panel C provides return predictability results. As before, firm idiosyncratic volatility predicts subsequent returns the best, while pure country and pure industry effect has less ability to predict returns. Panel D reports the results of variance decomposition and shows that firm idiosyncratic risk is the largest component of firm BM variance,

Table 3.9: Robustness Tests

This table summarizes the value-weighted analysis for previous Table 3.2, Table 3.3, Table 3.5 and Table 3.7. Panel A regresses firm valuation ratios (VR) on value-weighted country and industry averages along with other variables in regression specification 4 (reg4) in Table 2. Panel B reports results from Heston and Rouwenhorst (1994) regression using value-weighted method. The reported numbers are the standard deviations of pure country (pure industry) adjustment coefficients across countries or across industries. Panel C shows the one year ahead return predictability of three decomposed components of BM and EP from Panel B. Panel D shows the total variance and average percentages explained by world, country and industry adjustment variations from Panel B.

Panel A: Firm Level Regressions for Valuation Ratios (Table 3.2)

Location in Table 2	VR	Stat.	Country Average		Industry Average		Adj. R-square
			coeff.	t-stat	coeff.	t-stat	
Column 5	BM	reg4	1.29	11.26	0.55	4.30	0.21
Column 10	EP	reg4	1.16	13.06	0.39	4.07	0.17

Panel B: Country and Industry Adjustment Coefficients (Table 3.3)

Location in Table 3	VR	Stat.	Pure Country	Pure Industry	Pure Industry S.D/ Pure Country S.D.
Panel A Last Row	BM	S.D.	0.47	0.12	0.27
Panel B Last Row	EP	S.D.	0.04	0.01	0.21

Panel C: Return Predictability (Table3. 5)

Location in Table 5	VR	Stat.	Pure Country		Pure Industry		Firm Idiosyncratic	
			Returns	t-stat	Returns	t-stat	Returns	t-stat
Panel A Column 7	BM	P5-P1	1.55	0.51	2.79	0.67	5.63	2.48
Panel B Column 7	EP	P5-P1	1.91	0.58	1.44	0.42	2.54	1.75

Panel D: Variance Decomposition (Table 3.7)

Location in Table 7	VR	Stat.	Total Variance	Ratios			
				Country	Industry	Firm Idio.	World
Panel A Last Row	BM	Var.	0.47	30%	5%	60%	5%
Panel B Last Row	EP	Var.	0.61	22%	3%	72%	3%

while country risk accounts for the second largest proportion.

6.2. Can industry composition account for variations in mean country valuation ratios?

An interesting question is how much time-series variation in mean country valuation ratios can be explained based on industry composition. In the appendix, we examine the relative importance of the industry composition of the country in determining changes in the mean country multiple over time by extending the dummy variable analysis described earlier. As reported in Appendix Table A3.4, we find that the total-industry composition effect only accounts for less than 1% of the total variance in the country equal-weighted BM and EP ratios, and for less than 4% of the total variance in value-weighted ratios.

7. Summary

In this study, we examine the role of importance of country, industry and firm idiosyncratic components in determining firm valuation ratios. Using a sample of firms from 33 countries, we decompose Book-to-Market and Earnings-to-Price ratios into country, industry, and idiosyncratic components. Compared to industry membership, country membership has significantly more impact on the two valuation ratios. The two valuation ratios are found to predict subsequent stock returns around the world, and most of the predictability comes from idiosyncratic component of the two ratios. Evaluating how Book-to-Market and Earnings-to-Price ratios change over time, we find that the idiosyncratic and country components are the main drivers of the valuation ratios. However, the importance of country vs idiosyncratic proportion differs across countries. Such difference can be explained by country-level governance, market efficiency and capital openness and firm-level illiquidity and information uncertainty.

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APPENDIX 1

Industrial composition and Country Valuation Ratios

We examine the relative importance of the industry composition of the country in determining changes in the mean country multiple over time by extending the dummy variable analysis described earlier. We decompose the time-series variance of the mean ratio in a country (as described in equation 6 below) into the variance of the pure country effect and the variance of the industry effect. In this way, we can determine whether the pure country effect drives the variation of the mean country valuation ratio or the industry composition within the country drives the variation.

For example, we can decompose the average valuation ratio in Germany. Germany's average equal-weighted BM ratio, BM_{GE}^{ew}, can be separated into a component that is common across all countries $\hat{\alpha}$ which is the world effect, the average of the industry effects of all the securities in the country index, and a country-specific component $\hat{\gamma}_{GE}$ as in equation (4).

$$BM_{GE}^{ew} = \hat{\alpha} + \frac{1}{m_{GE}} \sum_{i=1}^{m_{GE}} \sum_{j=1}^{27} \hat{\beta}_j I_{i,j} + \hat{\gamma}_{GE} \qquad (6)$$

where the i-summation represents summing across different firms in Germany.

Equation (6) shows that the BM ratio in Germany can be different from the average BM ratio in the world because the industry composition of the market is different and because the BM ratio in Germany differs from the BM ratio in the same industry in other countries.

Germany's average value-weighted BM ratio, BM_{GE}^{vw}, also can be decomposed into three parts; the world effect, the industry composition effects and the pure country effect.

$$BM_{GE}^{vw} = \hat{\alpha} + \sum_{j=1}^{27} \phi_{j,GE} \hat{\beta}_j I_{j,GE} + \hat{\gamma}_{GE} \qquad (7)$$

where $\phi_{j,k}$ is the proportion of total market capitalization of industry j in Germany.

Appendix Table A3.4 provides the results of this analysis. Panel A shows the results for equal-weighted means, while Panel B shows the results for value-weighted means. The first column shows the pure country effect, the second column shows the sum of the industry effect, while the third column shows the sum of the industry effect as a proportion of the total variance of country multiple in excess of world average. The total-industry composition effect only accounts for 0.92% and 0.75% of the total variance in the country equal-weighted BM and EP ratios. The total-industry composition effects are higher for value-weighted BM and EP ratios at 3.58% and 2.81% as shown in Panel B. While there is considerable variation in the importance of the total-industry composition effect across the countries, Australia and New Zealand have the highest industry proportion of variance for both BM and EP ratios. These two countries are dominated by resource sectors and hence it is intuitive that industrial composition accounts for a large proportion of these countries' variance in valuation ratios.

APPENDIX 2

Table A3.1: Summary Statistics

Panel A and B report country and industry coverage in the data sample. The sample period is 01/01/1990-12/31/2006 and the data covers 33 countries and 27 industries. To be included in the sample, countries and industries are required to appear for at least 10 years in the sample. Firms should have returns, market capitalization, book-to-market (BM) and earning-to-price (EP) ratios. Panel A shows the number of industries in each country, the number of firms covered for the entire period, in year 1990, and in year 2006 in each country. Developed and emerging market countries are defined following the definition in MSCI Index 2006. Panel B shows the number of stocks in each industry, the number of stocks covered for the entire period, in year 1990, and in year 2006.

Panel A: Number of Firms by Country

Country (Developed)	Period	No. of Companies Total	1990	2006	No. of Industries	Country (Emerging)	Period	No. of Companies Total	1990	2006	No. of Industries
Australia	1990-2006	854	110	468	27	Brazil	1995-2006	221	0	126	25
Austria	1990-2006	150	38	64	22	China	1997-2006	634	0	578	27
Belgium	1990-2006	168	69	89	23	India	1994-2006	411	0	311	27
Canada	1990-2006	1,087	230	544	27	Malaysia	1990-2006	587	41	429	27
Denmark	1990-2006	290	62	133	24	Mexico	1994-2006	162	0	67	21
Finland	1991-2006	186	0	96	23	Philippines	1996-2006	152	0	97	22
France	1990-2006	1,055	298	452	27	Poland	1997-2006	110	0	70	23
Germany	1990-2006	894	235	384	27	South Africa	1990-2006	517	82	216	25
Greece	1993-2006	348	0	205	25	South Korea	1990-2006	865	47	574	27
Hong Kong	1990-2006	720	74	472	27	Taiwan	1995-2006	668	0	534	25
Italy	1990-2006	430	187	183	26	Turkey	1995-2006	197	0	146	25
Japan	1990-2006	2,388	978	1,571	27	Emg. Countries (11)	1990-2006	4,524	170	3,148	27
Netherlands	1990-2006	239	92	89	25						
New Zealand	1997-2006	102	0	67	22	All Countries (33)	1990-2006	25,467	5,449	12,337	27
Norway	1991-2006	250	0	102	26						
Portugal	1992-2006	124	0	32	23						
Singapore	1991-2006	382	0	257	26						
Spain	1990-2006	198	75	108	27						
Sweden	1990-2006	400	64	162	27						
Switzerland	1990-2006	386	169	169	24						
United Kingdom	1990-2006	2,189	995	712	27						
United States	1990-2006	8,103	1,603	2,830	27						
Dev. Countries (22)	1990-2006	20,943	5,279	9,189	27						

Table A3.1 (continued)

Panel B: Number of Firms by Industry

Industry (Nontraded)	Period	No. of Companies Total	1990	2006	No. of Countries	Industry (Traded)	Period	No. of Companies Total	1990	2006	No. of Countries
Beer	1990-2006	179	58	90	29	Food	1990-2006	865	233	492	33
Games	1990-2006	601	103	270	32	Clths	1990-2006	268	69	137	27
Books	1990-2006	321	96	160	30	Hlth	1990-2006	1,082	183	535	32
Hshld	1990-2006	475	131	241	31	Chems	1990-2006	648	182	397	33
Cnstr	1990-2006	1,595	462	785	32	Txtls	1990-2006	367	83	176	31
Util	1990-2006	536	163	333	31	Steel	1990-2006	568	154	295	32
Telcm	1990-2006	489	81	224	31	FabPr	1990-2006	990	271	448	32
Servs	1990-2006	2,441	302	1,050	33	ElcEq	1990-2006	478	116	172	29
BusEq	1990-2006	1,968	313	926	32	Autos	1990-2006	487	156	287	31
Trans	1990-2006	802	152	459	32	Carry	1990-2006	143	43	68	23
Whlsl	1990-2006	1,530	293	761	33	Mines	1990-2006	426	108	177	25
Rtail	1990-2006	1,271	317	652	33	Oil	1990-2006	694	117	304	29
Meals	1990-2006	504	93	223	31	Paper	1990-2006	501	161	213	33
Fin	1990-2006	5,238	1,009	2,462	33						
Nontraded (14)	1990-2006	17,950	3,573	8,636	33	Traded (13)	1990-2006	7,517	1,876	3,701	33
						All Industries (27)	1990-2006	25,467	5,449	12,337	33

Note : Industry Names are the following.

Beer & Liquor (Beer) Recreation (Games) Printing and Publishing (Books)
Consumer Goods (Hshld) Construction and Construction Materials (Cnstr) Utilities (Util)
Communication (Telcm) Personal and Business Services (Servs) Business Equipment (BusEq)
Transportation (Trans) Wholesale (Whlsl) Retail (Rtail)
Restaraunts, Hotels, Motels (Meals) Banking, Insurance, Real Estate, Trading (Fin) Food (Food Products)
Clths (Apparel) Hlth (Healthcare, Medical Equipment, Pharmaceutical Products)
Chems (Chemicals) Txtls (Textiles) Steel (Steel Works Etc)
FabPr (Fabricated Products and Machinery) ElcEq (Electrical Equipment) Autos (Automobiles and Trucks)
Carry (Aircraft, ships, and railroad equipment) Mines (Precious Metals, Non-Metallic, and Industrial Metal Mining)
Oil (Petroleumand Natural Gas) Paper (Business Supplies and Shipping Containers)

Table A3.2: Variable Definition

Variable	Description
Firm Level Variables	
BM	Book-to-Market ratio. Total Common Equity in the last fiscal year / Market Value of equity in the last December. Data items are obtained from Worldscope and Compustat.
EP	Earning Yield Ratio. Net Income in the last fiscal year/ Market Value of equity in the last December. Data items are obtained from Worldscope and Compustat.
Profit Margin	Profit Margin. Net Income in the last fiscal year /Net Sales in the last fiscal year. Data items are obtained from Worldscope and Compustat.
ROE	Return on equity. Net Income before extraordinary in the last fiscal year/Book Equity in the last fiscal year. Data items are obtained from Worldscope and Compustat.
Leverage	Book leverage. Total Debt in the last fiscal year/Total Common Equity in the last fiscal year. Firms with no reported debt are assigned a value of zero. Levered firms are riskier, ceteris paribus. Moreover, Gebhardt et al. (2001) suggest this measure is correlated with a firm's implied cost of capital. We therefore expect this variable to be negatively correlated with valuation ratios. Data items are obtained from Worldscope and Compustat.
Zero return illiquidity	Zero-return illiquidity. This variable is a measurement of stock liquidity based on zero return trading days that we calculate using daily returns (see Bekaert, Harvey and Lundblad (2007)). We use 12 month average of the proportion of zero daily returns over a month. Daily returns data is obtained from Datastream and CRSP.
Stock return volatility	Standard deviation of monthly returns. Monthly returns are obtained from Datastreama and CRSP.
Total BM(or EP) Variance	Time-series variance of firm BM (or EP), In the calculation, there should be at least 5 years observations. BM and EP are defined in the previous rows.
O-Score	Ohlson's (1980) O-score. This variable is a distress risk measurement based on Ohlson's (1980) equations. Accounting data items are obtained from Worldscope and Compustat.
No of Analysts	The number of analysts for one-year ahead earning forecast. This variable is a proxy for information uncertainty. (Source: I/B/E/S)
Earnings Forecast Dispersion	The standard deviation of earning forecasts per a stock over the price of the stock. This variable is a proxy for information uncertainty. (Source: I/B/E/S)

Table A3.2 (continued)

Variable	Description
Country Level Variables	
Common Law	Common law system. This variable is an indicator variable that equals one if the country belongs to common law systems (U.K. law). Common law system is associated with better governance (see La Porta et al. (1998)). We obtain common law information from La Porta et al. (2006) as they provide the most coverage of our sample countries. (Source: La Porta et al. (2006))
Capital Account Openness	Quinn's (1997) capital openness measure is employed. This measure uses data from International Monetary Fund's Annual Report on Exchange Arrange and Exchange Restrictions and it is scored from 0 to 8 and the measure is transformed into a 0 to 1 scale. (Source: Quinn and Toyoda (2008))
Political Stability	It is a proxy for country political stability, the International Country Risk Guide (ICRG)'s annual averages of political risk that scores as the political risk rating indicator which ranges between 0 (high risk) and 10 (low risk). The risk rating is a combination of 12 subcomponents. (Source: the International country Risk Guide.)
Synchronicity	Morck, Yeung and Yu (2000) and Jin and Myers (2006) introduce synchronicity for measuring market efficiency that is value-weighted average of R-squares of individual firm regressions on the market returns. Following Jin and Myers (2006) method, we obtain R-squares from our own calculation using monthly world/local market returns. Monthly stock returns are obtained from Datastream and CRSP.
GDPg	Log growth rates of Gross domestic product per capita in 2000. (Source: Penn World Table 6.3)
Inflation	Inflation rates based on GDP deflator. (Source: Penn World Table 6.3)

Table A3.3: Summary Statistics of Country and Firm Characteristics

This table reports time-series average of country and firm characteristic variables by country. Common law (Law) is an indicator if the country follows U.K. common law system, otherwise zero. Quinn's Capital account openness (Open) is a measurement of the extent of openness of capital account transactions. Political stability (Pol.) is an annual average of political risk scores for individual countries for each year by ICRG. GDPg is the growth rates of real GDP per capita for each country and Inflation (Inf) is calculated using GDP deflator. Synchronicity (R2) is a proxy for market efficiency that is value-weighted average of R-squares of individual firm following Jin and Myers (2006). Firm level variables are followings. Illiquidity (Illiq) is a measure of firm level illiquidity as a percentage of zero return trading days over the last year, Return volatility (Vol) is the standard deviation of monthly returns over the last year multiplied by 100, No of analysts (NoAnal) and Earnings Forecasts Dispersion (FSD) are proxies for information uncertainty. No of analysts is the analyst coverage reporting earnings forecast in I/B/E/S and Earnings forecasts dispersion is the standard deviation of analyst forecasts divided by the prior year-end stock price. O-score (Dis) is a proxy for firm distress risk that is calculated following Ohlson (1980). Profit Margin, Return on Equity (ROE), and Leverage are firm level accounting ratios.

Country	Country Characteristics						Firm Characteristics							
	Law	Open	Pol	GDPg	Inf	R2	Illiq	Vol	NAnal	FSD	Dis	PM	ROE	LEV
Australia	1	0.75	7.76	2.3%	2.3%	0.40	0.18	0.96	7.55	0.73	-4.40	0.00	0.13	0.28
Austria	0	0.88	8.09	1.8%	2.1%	0.38	0.38	0.84	5.59	1.09	-3.25	0.07	0.11	0.52
Belgium	0	0.95	7.64	1.8%	2.0%	0.42	0.35	0.68	7.03	1.01	-3.25	-0.56	0.13	0.40
Canada	1	1.00	7.89	1.8%	2.2%	0.28	0.25	1.12	7.24	1.04	-4.42	0.11	0.12	0.43
Denmark	0	1.00	8.04	1.9%	2.2%	0.27	0.56	0.73	6.01	1.23	-4.19	0.09	0.11	0.42
Finland	0	0.98	8.24	1.6%	1.8%	0.30	0.41	1.14	7.28	1.67	-3.93	0.08	0.13	0.50
France	0	0.91	7.44	1.4%	2.1%	0.32	0.27	1.10	9.06	0.92	-3.32	0.11	0.14	0.46
Germany	0	1.00	7.68	1.4%	2.1%	0.38	0.33	1.01	11.65	1.04	-3.49	-0.12	0.12	0.49
Greece	0	0.90	7.17	3.0%	2.1%	0.51	0.14	2.36	4.86	1.21	-3.80	0.23	0.14	0.27
Hong Kong	1	1.00	-	2.7%	1.8%	0.56	0.31	1.72	13.66	1.36	-5.69	0.17	0.14	0.25
Italy	0	0.98	7.20	1.3%	2.1%	0.44	0.13	1.03	9.78	1.30	-3.72	0.07	0.09	0.43
Japan	0	0.73	7.63	1.0%	2.0%	0.42	0.19	1.43	6.06	0.61	-5.70	0.07	0.06	0.47
Netherlands	0	1.00	8.21	2.0%	2.1%	0.39	0.24	0.87	13.74	0.98	-3.31	0.13	0.18	0.35
New Zealand	1	0.98	8.37	2.5%	2.2%	0.42	0.37	0.85	5.39	0.93	-4.41	0.18	0.14	0.46
Norway	0	1.00	7.97	2.8%	2.9%	0.42	0.45	1.29	7.37	1.70	-4.35	0.11	0.15	0.68
Portugal	0	0.87	7.90	1.6%	2.2%	0.42	0.38	0.90	7.99	1.39	-3.40	0.03	0.10	0.45
Singapore	1	0.96	7.99	3.8%	2.1%	0.49	0.31	1.61	12.05	1.19	-4.55	0.12	0.09	0.29
Spain	0	0.78	7.15	2.9%	2.2%	0.45	0.24	0.94	14.13	1.13	-3.96	0.10	0.12	0.34
Sweden	0	0.88	7.88	1.7%	1.8%	0.41	0.30	1.33	7.31	1.37	-4.53	0.07	0.15	0.54
Switzerland	0	1.00	8.29	0.6%	2.3%	0.38	0.41	0.76	7.38	1.10	-3.86	0.13	0.10	0.45
U.K.	1	1.00	7.71	2.1%	2.2%	0.29	0.53	1.22	6.09	0.65	-3.39	0.11	0.19	0.30
U.S.A.	1	1.00	7.59	1.9%	2.1%	0.20	0.15	1.34	8.12	0.42	-4.47	0.17	0.14	0.25
Brazil (E)	0	0.50	6.35	1.0%	1.8%	0.43	0.65	2.05	7.44	3.33	-4.98	0.10	0.12	0.34
China (E)	0	0.43	6.67	7.8%	1.5%	0.40	0.04	1.33	2.04	0.58	-5.10	0.12	0.08	0.40
India (E)	1	0.49	5.78	4.3%	1.6%	0.38	0.14	2.30	6.49	1.46	-4.81	-0.52	0.17	0.58
Malaysia (E)	1	0.54	7.13	4.6%	2.7%	0.53	0.26	1.90	10.87	1.24	-4.97	0.00	0.11	0.28
Mexico (E)	0	0.63	6.71	1.3%	2.0%	0.55	0.32	1.57	11.53	2.48	-5.87	0.10	0.13	0.33
Philippines (E)	0	0.75	6.51	1.7%	1.7%	0.49	0.59	1.99	-	-	-6.04	0.10	0.11	0.31
Poland (E)	0	0.48	7.39	4.0%	1.8%	0.52	0.20	1.77	5.44	1.50	-4.61	0.08	0.12	0.19
South Africa (E)	1	0.44	6.46	1.2%	2.0%	0.39	0.46	1.66	4.25	1.06	-4.89	-0.01	0.20	0.19
South Korea (E)	0	0.64	7.00	4.5%	1.6%	0.49	0.12	2.39	4.67	2.15	-6.01	0.08	0.09	0.69
Taiwan (E)	0	-	7.51	3.8%	1.4%	0.45	0.11	1.92	5.50	1.41	-6.24	0.10	0.11	0.34
Turkey (E)	0	0.63	5.65	2.5%	1.6%	0.63	0.19	4.29	-	-	-3.79	0.16	0.25	0.39

Table A3.4: Decomposition of the Variances of the Country Valuation Ratios

This table provides the variance of the components of country average valuation ratios in 33 countries. Each country valuation ratio is decomposed into a pure country effect and a sum of 27 industry effects using equal-weighted Heston and Rouwenhorst (1994) dummy variable regression methods. For Germany (GE), the equal-weighted country BM is the estimated world, the weighted-sum of industry adjustment coefficients and the Germany adjustment coefficient.

$$BM_{GE}^{ew} = \hat{\alpha} + \frac{1}{m_{GE}} \sum_{i=1}^{m_{GE}} \sum_{j=1}^{27} \hat{\beta}_j I_{i,j} + \hat{\gamma}_{GE}$$

The pure country effect is the time-series variance of pure country adjustment plus the world average, while cumulative industry effects is the variance of sum of industry effects. Industry portion shows the proportion of the combined variance explained by the industry effect.

Panel A: Equal-Weighted Method

	BM			EP		
	Pure country effect ($x10^2$)	Cumulative industry effects ($x10^2$)	Industry proportion (%)	Pure country effect ($x10^4$)	Cumulative industry effects ($x10^4$)	Industry proportion (%)
Australia	0.82	0.04	5.50	1.49	0.01	0.87
Austria	11.49	0.10	0.81	7.31	0.03	0.34
Belgium	6.91	0.02	0.28	7.88	0.02	0.20
Canada	1.96	0.02	1.13	2.88	0.05	1.73
Denmark	4.18	0.05	1.29	2.40	0.01	0.44
Finland	34.93	0.04	0.11	12.63	0.02	0.19
France	1.78	0.02	1.12	1.72	0.01	0.81
Germany	2.12	0.03	1.47	1.83	0.02	1.38
Greece	11.02	0.07	0.73	19.87	0.02	0.12
Hong Kong	8.62	0.03	0.38	1.81	0.02	1.45
Italy	15.28	0.01	0.04	7.57	0.02	0.20
Japan	12.50	0.01	0.06	2.35	0.02	0.68
Netherlands	2.15	0.01	0.27	2.06	0.00	0.19
New Zealand	0.57	0.03	4.03	0.48	0.03	6.28
Norway	15.85	0.02	0.15	7.58	0.05	0.65
Portugal	1.53	0.05	2.67	4.83	0.02	0.53
Singapore	6.54	0.03	0.42	3.58	0.01	0.35
Spain	4.16	0.02	0.45	1.88	0.02	1.05
Sweden	19.79	0.03	0.13	21.80	0.04	0.16
Switzerland	28.25	0.01	0.05	9.86	0.00	0.03
United Kingdom	0.86	0.00	0.55	1.01	0.01	0.50
United States	1.10	0.01	0.85	1.66	0.01	0.32
Brazil (E)	33.45	0.04	0.13	24.09	0.04	0.14
China (E)	0.98	0.01	1.33	1.19	0.01	1.32
India (E)	26.65	0.02	0.09	19.09	0.03	0.14
Malaysia (E)	10.59	0.07	0.59	4.35	0.05	0.98
Mexico (E)	5.93	0.05	0.78	4.67	0.02	0.54
Philippines (E)	25.55	0.01	0.04	10.00	0.02	0.19
Poland (E)	5.35	0.02	0.31	7.03	0.02	0.26
South Africa (E)	3.17	0.04	1.26	9.70	0.02	0.19
South Korea (E)	46.28	0.01	0.03	34.93	0.02	0.05
Taiwan (E)	8.84	0.09	1.18	3.60	0.06	2.04
Turkey (E)	8.16	0.22	2.25	15.13	0.08	0.56
Dev. Mean	8.75	0.03	1.02	5.66	0.02	0.84
Emg. Mean	15.91	0.05	0.73	12.16	0.03	0.58
All Mean	11.13	0.04	0.92	7.83	0.02	0.75

Table A3.4 (continued)

Panel B: Value-Weighted Method

	BM			EP		
	Pure country effect ($x10^2$)	Cumulative industry effects ($x10^2$)	Industry proportion (%)	Pure country effect ($x10^2$)	Cumulative industry effects ($x10^4$)	Industry proportion (%)
Australia	1.00	0.16	25.05	1.54	0.03	2.25
Austria	11.11	0.21	1.74	7.34	0.11	1.38
Belgium	8.62	0.10	1.37	8.89	0.06	0.73
Canada	2.06	0.07	3.57	2.60	0.10	4.05
Denmark	3.93	0.09	2.66	2.10	0.07	3.08
Finland	37.88	0.66	1.67	13.87	0.23	1.68
France	2.16	0.01	0.53	2.01	0.04	1.89
Germany	2.16	0.02	1.17	1.63	0.01	0.58
Greece	12.61	0.09	0.70	22.79	0.10	0.42
Hong Kong	7.30	0.04	0.55	1.78	0.08	6.28
Italy	16.68	0.07	0.38	8.15	0.09	1.06
Japan	11.11	0.02	0.20	2.09	0.03	1.71
Netherlands	3.07	0.07	2.70	2.31	0.14	5.65
New Zealand	0.34	0.18	30.25	0.57	0.12	22.16
Norway	15.62	0.17	1.06	8.03	0.32	3.97
Portugal	1.54	0.04	2.53	4.36	0.10	2.69
Singapore	5.63	0.04	0.74	2.67	0.03	1.26
Spain	4.93	0.05	1.10	2.25	0.07	3.24
Sweden	22.28	0.23	1.17	23.19	0.09	0.40
Switzerland	30.45	0.18	0.66	10.29	0.07	0.76
United Kingdom	0.91	0.03	4.32	0.97	0.02	2.54
United States	1.22	0.01	0.78	1.69	0.01	0.50
Brazil (E)	24.00	0.10	0.40	24.83	0.10	0.38
China (E)	1.28	0.02	1.89	1.47	0.03	2.56
India (E)	25.43	0.03	0.11	19.70	0.11	0.53
Malaysia (E)	9.01	0.14	1.32	3.77	0.06	1.36
Mexico (E)	5.42	0.20	2.98	4.50	0.13	2.62
Philippines (E)	25.88	0.07	0.30	10.44	0.13	1.38
Poland (E)	3.95	0.25	7.36	7.03	0.18	2.68
South Africa (E)	2.69	0.34	11.21	10.00	0.14	1.30
South Korea (E)	43.78	0.04	0.10	32.38	0.06	0.19
Taiwan (E)	8.55	0.34	5.43	2.95	0.21	10.65
Turkey (E)	7.13	0.14	2.06	15.91	0.10	0.65
Dev. Mean	9.21	0.12	3.86	5.96	0.09	3.10
Emg. Mean	14.28	0.15	3.02	12.09	0.11	2.21
All Mean	10.90	0.13	3.58	8.00	0.10	2.81

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CHAPTER 4

CAN THE LONG-RUN RISKS EXPLAIN THE INTERNATIONAL VALUE PREMIUM? EVIDENCE USING LAST CENTURY DATA

1. Introduction

The value premium refers to the empirical finding that firms with high book-to-market equity ratios (value firms) have higher average returns than firms with low book-to-market equity ratios (growth firms). Many papers have conjectured that such a cross-sectional pattern in returns is related to non-diversifiable risks.[30] In a neoclassical framework, the value premium arises because value firms are riskier than growth firms in bad times when the price of risk is high, and thus are required to provide higher risk premium.[31]

Recently, Bansal and Yaron (2004) develop a long-run risk (LRR) model that introduces three distinct sources of risks in asset pricing: short-run, long-run, and expected consumption volatility risks. Under a LRR framework, the exposure of returns of value firms to long-run risk or to the volatility risk is higher than the exposure of returns of growth firms. Bansal, Dittmar, and Lundblad (2005) and Hansen, Heaton and Li (2008) find that the long-run risk component is a major driver of value premiums, while Kiku (2006), Bansal, Kiku and Yaron (2007), and Boguth and Kuehn (2009) emphasize the importance of the volatility risk in explaining the value premium.[32] These studies focus only on the U.S., leaving open the question whether long run consumption dynamics can explain the value premiums in other countries.

[30] Fama and French (1992, 1993, 1995); Zhang (2005); Petkova and Zhang (2005); Guo et al. (2009)
[31] Zhang (2005).
[32] In related framework, Bansal, Dittmar, and Lundblad (2005) and Lettau and Wachter (2007) show that the cash flow risk can account for the cross-sectional variation of returns.

In this paper, we provide international evidence for the usefulness of long-run risk models in explaining value premiums in 17 developed countries using a long sample of data.[33] These countries account for 90% of the world's equity market. Barro and Ursúa (2008) recently collect a sample of country level consumption data that dates back to the 1800's, including three major economic disasters: World War I, the Great Depression, and World War II. Combining Barro and Ursúa's dataset with another long historical dataset called Global Financial Data (GFD), we estimate long-run consumption risk and consumption volatility risk. We then examine whether these consumption risk factors explain the value premium observed in recent decades. We conduct the analysis under the assumptions of market integration, segmentation and partial segmentation.[34]

The findings are as follows. First, we show the performance of the long-run risks model in the U.S. as well as in international market (or outside the US). In the U.S. market, our results confirm Kiku (2006) and Bansal, Kiku, and Yaron (2007)'s findings that the long-run risks framework explains most observed value premium in the U.S. However, outside the U.S., we find weak association between long-run risks components and value premium as the long-run risks model produces positive implied value premiums in less than half markets in our sample. Second, after we break down the implied value premium into three risk-related components, we find that, outside the U.S., the long-run consumption risk produces positive value premiums in only 6 countries, while the predicted consumption volatility risk produces positive value premiums in 12 countries. Most of the explanatory power of the international value

[33] The 17 countries in our sample is Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Italy, Japan, the Netherlands, Norway, Spain, Sweden, Switzerland, the United Kingdom, and the United States.
[34] Hou, Karolyi, and Kho (2009) find that global risks price financial assets, while Griffin (2002) shows that country-specific Fama-French three factors performs better than a global version of Fama and French factors.

premium by the LRR model comes from consumption volatility risk, lending support to the theory that time-varying concerns for future consumption are the main drivers of the value premium. Finally, we confirm Barro's (2006, 2009) argument that long historical data is important for capturing the effects of different regimes in financial asset prices. Overall, the empirical evidence involving global consumption volatility risk implies that, under the market integration assumption, value firms are riskier and are expected to perform poorly when the expected economic uncertainty is high.

In order to substantiate our international evidence, we conduct various robustness checks regarding sample period, consumption data and econometric methodology. We also relax the market integration assumption. Our findings confirm that outside the U.S. the long-run component has weak association with the value premiums, while the volatility component is related to value premium in international markets.

Related Literature

Previous literature has investigated why the value premium exists. Fama and French (1992, 1993, and 1995) suggest that systematic factors explain the value premium, while Lakonishok, Shleifer and Vishny (1994) propose that investors' mispricing largely induces the value premium and Griffin and Lemmon (2002) show that value premiums within high distress risks group arise from investors' mispricing. Lettau and Wachter (2007) show in their dynamic risk-based model that growth firms covary more with cash flows than do value firms. Zhang (2005) proposes that it exists because value firms are riskier than growth firms in bad times when the price of risk is high.[35] A long-run risk based explanation is in line with Zhang (2005)'s intuition that value firms are riskier when the economy is in a bad condition, and are required to

[35] Petkova and Zhang (2005) and Guo et al. (2009) provide empirical support.

provide higher risk premium when expected growth is low and economic uncertainty increases. Asness, Moskowitz and Pedersen (2009) confirm the existence of the value premium in the U.S., U.K,, Japan, and Europe. They find that liquidity risk is positively related to value premium. They further find a link between value premium and macroeconomic variables such as long-run consumption growth. Recent international asset pricing studies adapt the LRR model framework in various issues. Colacito and Croce (2008) propose a two-country LRR model in explaining the exchange rate volatility. Bansal and Shaliastovich (2009) provide the LRR based explanation for the predictability puzzles in bond and currency markets. Lewis and Liu (2009) examine the gains from international consumption risk-sharing. Rangvid, Schmeling and Schrimpf (2009) examine whether long-run expected consumption growth can explain returns in different asset classes in G7 countries.

The rest of the paper is organized as follows. The theoretical framework of this paper is presented in the next section. In section 3, data is described and econometric methodology in estimating LRR is introduced. In section 4, we provide estimation results and discuss the findings. Section 5 concludes this paper.

2. Theoretical Framework

2.1 . The Long-Run Risks Model

A representative agent follows Epstein and Zin (1989)'s recursive preference which separates the risk aversion parameter (RA) from the intertemporal elasticity of substitution (IES). Under an intertemporal budget constraint, the first order condition yields an Euler equation as follows.

$$E_t\left[\left\{\delta\left(\frac{C_{t+1}}{C_t}\right)^{-\frac{1}{\psi}}\right\}^{\theta}\left\{R_{a,t+1}\right\}^{(\theta-1)}R_{i,t+1}\right]=1 \tag{1}$$

where C_t is consumption, $R_{a,t+1}$ is the gross simple return on the portfolio of all invested wealth held by the agent, $R_{i,t+1}$ is the gross return of any asset i, δ is the rate of time preference, $0 < \delta < 1$, $\theta \equiv \frac{1-\gamma}{1-\frac{1}{\psi}}$, γ is the RA of a representative agent, $\gamma \geq 0$, and ψ is the IES of a representative agent, $\psi \geq 0$.

The log intertemporal marginal rate of substitution (IMRS), m_{t+1}, is defined as

$$m_{t+1} = \theta \log \delta - \frac{\theta}{\psi} g_{t+1} + (\theta - 1) r_{a,t+1} \tag{2}$$

where g_{t+1} is the log consumption growth, $\log \frac{C_{t+1}}{C_t}$ and $r_{a,t+1}$ is $\log R_a$.

The Euler equation (1) is:

$$E_t[\exp(m_{t+1} + r_{i,t+1})] = 1 \tag{3}$$

where $r_{i,t+1}$ is the log return of asset i. From the log IMRS equation above, the innovation of the log IMRS depends on the innovation of consumption growth and portfolio returns.

Bansal and Yaron (2004) introduce a small persistent predictable component (also called a long-run risk component) and a time-varying volatility component in the innovation of consumption growth. These components represent economic fluctuation and economic uncertainty, respectively. The consumption dynamics are:

$$\begin{aligned} g_{t+1} &= \mu_c + x_t + \sigma_t \eta_{t+1} \\ x_{t+1} &= \rho x_t + \varphi \sigma_t e_{t+1} \\ \sigma_{t+1}^2 &= \bar{\sigma}^2 + \nu(\sigma_t^2 - \bar{\sigma}^2) + \sigma_w w_{t+1} \end{aligned} \tag{4}$$

where η_{t+1}, e_{t+1}, and w_{t+1} are i.i.d. x_t is the long-run component and σ_{t+1}^2 is the volatility component. The parameters ρ and ν govern the persistence of consumption growth and the volatility process respectively. A time-varying volatility in consumption growth, σ_{t+1}, leads to time-varying risk premium. $\bar{\sigma}^2$ is the unconditional variance of consumption growth.

The returns on all invested wealth held by the agent are unobservable. A linear relationship for the log returns on the aggregate portfolio is obtained by applying Campbell and Shiller's (1988) linear approximation.

$$r_{a,t+1} = \kappa_0 + \kappa_1 z_{t+1} - z_t + g_{t+1} \tag{5}$$

where z_t is the log price-consumption ratio that is not observed. It can be derived from the linear relation with long-run component and stochastic volatility component, following Bansal and Yaron (2004).

$$z_t = A_0 + A_1 x_t + A_2 \sigma_t^2 \tag{6}$$

The coefficients of A_0, A_1, and A_2 are solved in Appendix A2 under that assumptions that $r_{i,t+1}$ equals $r_{a,t+1}$ in (3), and that m_{t+1} and $r_{a,t+1}$ follow normal distributions. The elasticity of the log price-consumption ratio with respect to the expected growth component increases when A_1 is positive, and the elasticity with respect to an increase in economic uncertainty decreases when A_2 is negative and the IES parameter is greater than one. Plugging equations (4), (5), and (6) into (3), the innovation of log IMRS is

$$m_{t+1} - E_t(m_{t+1}) = -\lambda_\eta \sigma_t \eta_{t+1} - \lambda_e \sigma_t e_{t+1} - \lambda_w \sigma_w w_{t+1} \tag{7}$$

For each asset i, dividend growth has the following processes:,

$$g_{d,i,t+1} = \mu_{d,i} + \phi_{d,i} x_t + \pi_{d,i} \sigma_t \eta_{t+1} + \varphi_{d,i} \sigma_t u_{d,i,t+1} \tag{8}$$

where $g_{d,i,t+1}$ is log dividend growth, $\mu_{d,i}$ is the average of the dividend growth, and $u_{d,i,t+1}$ is the shock to dividend growth (or, dividend news). $\phi_{d,i}$ captures dividend exposure to the persistent component in consumption, x_t. The i.i.d. consumption shock, η_{t+1}, influences the dividend process as an additional source of risk premium. $\pi_{d,i}$ governs the magnitude of the influence.[36] Using a similar approach to $r_{a,t+1}$, the innovation of the asset i return is derived as,

[36] We follow Bansal, Kiku, and Yaron (2007)'s dividend growth dynamics. Beeler and Campbell (2009) show that Bansal, Kiku, and Yaron (2007)'s modification produces better performance of the long-run growth model. The dynamic of dividend growth in Bansal and Yaron (2004) does not include

$$r_{i,t+1} - E_t[r_{i,t+1}] = \varphi_{d,i}\sigma_t u_{i,t+1} + \beta_{\eta,i}\sigma_t\eta_{t+1} + \beta_{e,i}\sigma_t e_{t+1} + \beta_{w,i}\sigma_w w_{t+1} \tag{9}$$

The solutions for β's are in Appendix A2. $\sigma_t\eta_{t+1}$, $\sigma_t e_{t+1}$, and $\sigma_w w_{t+1}$ are short-run shock, long-run shock, and volatility shock respectively.

The covariation of the return innovation with the innovation in the log IMRS determines the risk premium for any asset i. The risk premium for $r_{i,t+1}$ is equal to,

$$E_t[r_{i,t+1} - r_{f,t+1}] + \frac{1}{2}\sigma_i^2 = \lambda_\eta\sigma_t^2\beta_{\eta,i} + \lambda_e\sigma_t^2\beta_{e,i} + \lambda_w\sigma_w^2\beta_{w,i} \tag{10}$$

$\beta_{\eta,i}$, $\beta_{e,i}$, and $\beta_{w,i}$ are betas with respect to the short-run risk, long-run risk, and volatility risk source for asset i, respectively. λ_η, λ_e, and λ_w are market prices of these risks.

2.2 LRR Model in an International Context

In applying the LRR model in international markets, two separate analyses are used. First, under the perfect market segmentation, any asset i in a country j is priced under country j's Euler equation. Each country has its own consumption dynamics. Thus, the value premiums arise because value firms are more exposed to the local LRR factors.

Second, under perfect market integration, a representative agent in a country j observes the world consumption dynamics within a single basket of consumption sets. To provide flexibility in the perfect market integration assumption[37], RA and IES of the agent can be different across countries. In a perfectly integrated world, the value premium in each country can be observed because value firms in each country are more exposed to the global LRR factors with different RA and IES parameters of investors. Thus, the level of the value premium is observed differently across

consumption shock as a source of risk premia, η_{t+1}. Thus, $\pi_{d,i}$ in Bansal and Yaron (2004) equals zero.

[37] We also conduct an analysis that there is only one set of RA and IES in the world and apply them in explaining the world value weighted value premium.

countries. The world consumption per capita, C_t^w, is the weighted average of consumption per capita for each country using real US dollar GDP as weights, a_t^j. The world consumption growth rates are the log differences of world consumption in the following.

$$g_{t+1}^w = \log \frac{C_{t+1}^w}{C_t^w} = \log \frac{\sum_{j=1}^{J} a_{t+1}^j C_{t+1}^j}{\sum_{j=1}^{J} a_t^j C_t^j} \text{ and } \sum_{j=1}^{J} a_t^j = 1. \quad (11)$$

[38]

In a perfectly integrated market, law of one price (LOP) holds. We follow the LOP assumption by using the purchasing power parity adjusted consumption series in calculating the real U.S. GDP weighted consumption per capita.

3. Data and Methodology

3.1 Data

3.1.1. Consumption and Aggregate Economic Data

Our dataset includes 17 countries, with consumption and aggregate economic data starting between 1886 and 1933 and ending in 2008. [39] We mainly use Barro and Ursúa's (2008) real private consumption per capita in measuring the consumption growth rates outside the U.S. market. Barro and Ursúa's (2008) have developed a set of historical consumption data of 40 countries similar to Maddison (2003) output data.

[38] An alternative is to use the weighted sum of each country's consumption growth rates, e.g. Lewis and Liu (2009). In that case, the world consumption growth rates would be higher due to Jensen's inequality. The estimation has been done under such a specification and the result is similar.

$$g_{t+1}^{w,LL} = \sum_{j=1}^{17} a_{t+1}^j \log \frac{C_{t+1}^j}{C_t^j} \geq g_{t+1}^W$$

We also examine their calculation method in this paper.

[39] The selected countries are Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Italy, Japan, the Netherlands, Norway, Spain, Sweden, Switzerland, the United Kingdom, and the United States. Austria has interrupted consumption series in 1919-1924 and 1945-1947. However, we include Austria because the series cover the World War I, the Great Depression, and World War II. We update the consumption data in 2007 and 2008 using various sources. The detailed description is in Appendix Table I and II.

The series begins in 1800s for most countries and ends in 2006. Their sample includes 21 Organization for Economic Co-Operation and Development (OECD) member countries and 18 non-OECD countries. We select OECD member countries which have uninterrupted consumption series at least before World War II.[40] These countries are required to have available more than 10 years of individual common equity returns in Datastream.

For all other aggregate economic variables except for consumption data, we obtain real GDP per capita, population, CPI, long-term government bond yield, three-month Treasury bill yield, and market dividend yield from Global Financial Data (GFD). Appendix A.3 provides detailed explanation for international consumption and aggregate economic data sources.

Table 4.1 reports summary statistics variables used in measuring long-run and volatility components. Panel A and Panel B report the average and standard deviations of real consumption growth for each decade and each country. We calculate world consumption per capita as the weighted average of our sample countries' real private consumption per capita. The real U.S. dollar GDP is used for country weight and its percentage is reported in Panel C. Most countries experienced World War I, the Great Depression, and World War II during 1914-1918, 1929-1939, and 1939-1945 respectively. In the decades starting 1910, 1930, and 1940, the averages for consumption are negative or close to zero and the standard deviations are

[40] These countries are also classified as developed countries based on MSCI index definition as of 2006. MSCI definition of developed countries is at http://www.mscibarra.com/products/indices/equity/definitions.jsp.

Table 4.1: Summary Statistics of Long-Run Consumption Growth Rates

This table reports summary statistics of long-run macroeconomic data sample from 1880 to 2008. Panel A reports the average of consumption growth rates for each decade. The growth rates are log differences of real private consumption per capita. The numbers are in percentage. Panel B shows the standard deviation for each decade. Panel C shows the percentage of country weight. Panel D reports the mean of macroeconomic variables. Variables are reported in percentage except for logPD.

Panel A: Mean of Consumption Growth for Each Decade

Country	1880	1890	1900	1910	1920	1930	1940	1950	1960	1970	1980	1990	2000	Average
Australia	-	-	1.3	-1.1	2.1	-0.7	2.2	0.9	3.0	1.8	1.8	1.9	2.6	1.4
Austria	-	-	-	-12.0	3.0	0.0	0.7	5.7	3.7	3.8	2.0	1.8	1.2	1.0
Belgium	-	-	-	-4.4	3.8	-0.1	-0.2	1.9	3.1	3.9	1.5	1.6	1.3	1.2
Canada	2.5	2.0	2.0	-0.8	4.2	-1.1	4.1	2.5	2.3	3.0	1.5	0.9	2.3	2.0
Denmark	1.4	1.2	2.1	3.7	-0.5	1.5	0.6	1.6	3.2	1.3	0.5	1.1	1.5	1.5
Finland	1.4	2.5	1.8	-1.2	4.0	1.2	1.7	3.2	4.6	3.3	3.3	0.6	2.9	2.3
France	0.5	0.6	0.8	-0.4	2.4	-0.9	0.8	3.4	4.4	3.4	1.8	1.2	1.6	1.5
Germany	1.1	1.8	0.7	-3.4	4.3	1.2	-2.6	7.0	4.1	3.7	1.7	1.7	0.6	1.7
Italy	-0.3	0.2	1.9	0.6	1.6	-0.3	0.8	3.8	5.7	3.3	2.9	1.6	0.5	1.7
Japan	1.8	1.8	0.0	2.4	1.0	-1.4	-3.2	8.3	8.1	4.2	2.7	1.6	0.9	2.2
Netherlands	1.7	0.3	0.8	-1.8	4.1	0.6	1.4	1.8	4.7	3.0	0.3	2.4	0.7	1.6
Norway	1.1	1.7	0.4	2.9	0.6	2.1	1.0	1.6	3.7	2.9	1.5	2.6	3.1	1.9
Spain	0.7	0.5	1.0	-0.6	3.7	-4.7	0.9	5.0	5.7	3.1	1.8	2.1	2.3	1.7
Sweden	1.5	2.6	2.1	1.8	1.6	2.9	0.4	2.8	2.8	1.6	1.4	0.5	1.8	1.8
Switzerland	0.3	3.1	0.7	-0.2	2.8	0.9	0.5	1.8	2.9	2.0	1.2	0.5	1.1	1.4
U.K.	1.0	1.5	-0.1	0.3	1.4	1.1	0.3	2.0	1.7	2.4	3.1	1.9	2.4	1.5
U.S.A	0.8	1.5	1.6	-0.1	1.7	0.3	2.7	1.9	3.0	2.4	2.3	2.0	1.8	1.7
World	1.0	1.5	0.9	0.1	2.0	0.2	2.0	2.3	3.2	2.7	2.2	1.8	1.6	1.7

Panel B: Standard Deviation of Consumption Growth for Each Decade

Country	1880	1890	1900	1910	1920	1930	1940	1950	1960	1970	1980	1990	2000	Average
Australia	-	-	5.1	6.5	5.0	9.3	9.1	3.4	2.4	1.4	1.5	1.6	0.8	4.2
Austria	-	-	-	18.2	1.9	6.9	19.7	2.4	1.1	2.0	1.6	1.5	0.9	5.6
Belgium	-	-	-	21.6	4.3	2.9	22.5	2.7	1.3	2.0	1.4	1.1	1.0	6.1
Canada	4.7	5.3	6.4	6.5	8.5	5.3	4.0	2.3	1.4	1.7	2.3	1.8	1.3	4.0
Denmark	4.4	2.0	1.9	8.0	9.2	2.5	13.4	2.5	1.6	2.8	3.3	2.0	2.1	4.3
Finland	3.7	5.2	4.5	13.0	3.8	6.9	9.5	4.6	3.1	2.9	1.3	3.9	1.5	4.9
France	4.4	3.9	2.9	9.5	5.9	3.6	20.7	2.0	0.9	1.2	1.0	1.3	0.9	4.5
Germany	2.7	1.9	1.6	10.4	10.4	4.1	10.4	2.6	2.0	1.8	1.5	1.0	1.0	4.0
Italy	2.4	1.9	1.3	3.0	2.9	3.1	10.0	1.5	1.8	1.9	1.7	1.8	1.1	2.6
Japan	4.8	4.1	4.7	3.7	2.5	2.6	21.1	3.2	1.6	2.9	1.4	1.3	1.0	4.2
Netherlands	3.2	5.0	3.9	19.0	5.4	2.4	23.3	3.4	1.3	1.6	2.1	1.6	1.2	5.6
Norway	2.2	1.2	1.5	8.7	7.2	2.6	3.9	1.4	1.9	2.7	3.4	1.5	1.2	3.0
Spain	3.2	6.6	5.2	7.0	8.2	19.2	11.6	5.4	4.3	2.7	2.8	2.1	1.0	6.1
Sweden	4.3	3.2	3.9	7.0	6.6	2.9	8.7	3.3	1.2	1.9	2.4	2.4	1.5	3.8
Switzerland	12.1	7.9	5.3	4.1	4.9	5.4	8.8	1.6	0.7	2.1	0.7	1.1	0.8	4.3
U.K.	1.8	1.7	0.8	6.3	1.4	1.3	5.5	2.0	1.1	2.7	2.5	1.9	1.1	2.3
U.S.A	4.3	5.0	2.9	3.2	4.7	6.2	3.9	2.1	1.6	1.9	2.0	1.4	1.1	3.1
World	1.3	1.6	1.5	2.9	2.9	2.6	3.6	1.9	0.8	1.5	1.4	0.9	0.9	1.8

Table 4.1 (continued)

Panel C: Percentage of Real US GDP for Each Decade

Country	1880	1890	1900	1910	1920	1930	1940	1950	1960	1970	1980	1990	2000	Average
Australia	-	-	1.5	1.7	1.8	1.7	1.9	1.8	1.8	1.9	1.9	2.0	2.2	1.8
Austria	-	-	-	1.7	1.4	1.3	1.0	1.0	1.0	1.1	1.0	1.0	1.0	1.2
Belgium	-	-	-	1.3	2.0	2.1	1.3	1.6	1.4	1.4	1.4	1.3	1.2	1.5
Canada	1.4	1.4	1.8	2.3	2.2	2.1	3.0	3.1	3.1	3.3	3.4	3.3	3.6	2.6
Denmark	1.0	1.1	1.1	1.1	1.3	1.5	1.2	1.2	1.2	1.1	1.0	0.9	0.8	1.1
Finland	-	-	-	0.5	0.5	0.6	0.6	0.6	0.6	0.6	0.7	0.6	0.6	0.6
France	14.0	12.3	10.5	7.9	9.0	8.6	5.2	6.8	7.2	7.5	7.5	7.1	7.0	8.5
Germany	22.1	23.5	22.9	19.0	14.3	14.6	10.3	11.2	12.3	11.5	10.6	10.3	9.5	14.8
Italy	7.0	6.2	5.6	6.1	6.1	6.5	5.0	5.2	5.8	5.9	6.2	6.2	6.0	6.0
Japan	4.9	5.3	5.0	5.4	6.3	7.3	6.3	6.2	9.3	13.2	14.5	15.1	13.4	8.6
Netherlands	2.2	2.1	1.9	1.8	2.3	2.4	1.7	2.1	2.1	2.2	2.0	2.0	2.1	2.1
Norway	0.7	0.7	0.6	0.6	0.7	0.8	0.7	0.8	0.8	0.8	0.8	0.8	0.9	0.7
Spain	5.5	4.7	4.1	3.7	4.0	3.6	2.8	2.7	3.1	3.7	3.5	3.6	3.7	3.7
Sweden	1.4	1.5	1.5	1.5	1.4	1.7	1.7	1.7	1.6	1.5	1.4	1.2	1.2	1.5
Switzerland	-	-	-	2.1	2.1	2.3	1.8	1.9	1.9	1.7	1.5	1.3	1.2	1.8
U.K.	19.2	19.3	17.6	16.1	14.3	14.8	14.5	11.5	9.6	8.2	7.4	7.2	7.5	12.9
U.S.A	20.6	22.0	25.9	27.2	30.2	28.1	41.1	40.6	37.1	34.5	35.3	36.2	38.0	32.1
World	100	100	100	100	100	100	100	100	100	100	100	100	100	100

Panel D: Mean of Macroeconomic Variables

Country	1880-1949					1950-2008					1880-2008				
	GDPg	logPD	RF_lt	RF_st	Infl	GDPg	logPD	RF_lt	RF_st	Infl	GDPg	logPD	RF_lt	RF_st	Infl
Australia	1.1	2.7	2.5	-0.2	1.7	2.1	3.0	2.3	1.0	5.2	1.5	2.8	2.5	0.8	3.3
Austria	0.9	3.1	0.8	-	4.3	3.4	3.8	2.9	2.3	3.6	1.9	3.6	2.0	2.3	3.9
Belgium	1.1	2.6	1.4	2.7	3.3	2.5	3.3	3.5	2.7	3.4	1.7	3.2	2.9	2.7	3.4
Canada	1.8	2.9	1.9	-2.8	2.2	2.3	3.5	3.1	1.9	3.7	2.0	3.3	2.7	1.0	3.1
Denmark	1.6	-	2.4	-	1.8	2.2	3.7	3.8	5.5	4.8	1.8	3.7	3.1	5.5	3.0
Finland	1.7	-	-0.8	-	9.0	3.0	3.2	2.9	3.0	5.2	2.2	3.2	1.9	3.0	6.2
France	1.0	3.4	-2.4	-13.7	6.3	2.7	3.3	2.5	1.6	4.7	1.7	3.3	-0.3	-2.4	5.6
Germany	0.7	3.1	5.2	-	0.4	3.1	3.5	3.7	1.8	2.7	1.6	3.3	4.1	1.8	2.1
Italy	1.1	3.4	-2.9	-32.2	7.6	3.2	3.4	3.0	1.7	5.8	2.0	3.4	-0.4	-3.6	6.8
Japan	1.3	2.6	-0.4	-	7.1	4.3	3.9	2.6	0.3	3.3	2.5	3.3	0.8	0.3	5.5
Netherlands	1.0	-	2.7	-5.8	1.1	2.5	3.1	2.4	0.9	3.7	1.6	3.1	2.7	0.1	2.2
Norway	1.7	-	2.5	-	1.7	2.9	3.6	2.0	4.0	4.8	2.2	3.6	2.4	4.0	3.0
Spain	0.8	3.4	1.0	-	4.9	3.4	3.1	1.5	2.6	6.8	1.9	3.1	1.4	2.6	6.1
Sweden	2.1	3.0	2.0	-	1.4	2.3	3.5	2.4	1.6	4.7	2.2	3.3	2.2	1.6	2.8
Switzerland	1.2	3.0	2.3	-	1.9	1.9	3.8	1.3	1.1	2.6	1.4	3.5	1.7	1.1	2.4
U.K.	1.1	3.1	0.3	0.9	0.8	2.1	3.1	2.5	1.7	5.2	1.5	3.1	2.0	1.4	2.7
U.S.A	2.0	3.0	2.2	0.7	1.2	2.1	3.5	2.4	1.1	3.7	2.0	3.2	2.3	1.0	2.3
World	1.4	3.1	2.2	0.7	-	2.3	3.5	2.4	1.1	-	1.8	3.4	2.3	1.0	-

high. Panel D reports real GDP growth rates, log market price-to-dividend ratio, real long-term and short-term risk free rates, and inflation rates.

3.1.2 International Stock Returns

International stock returns and book-to-market ratios are available from January 1980 to December 2008 through Datastream and Worldscope while the U.S. value and growth portfolio data starting from 1930 is directly from Professor Kenneth French's data library.[41] We first obtain a list of active and inactive common equity stocks of each country from Datastream. The initial list includes 25,059 active and inactive stocks for the sample countries outside the U.S. Monthly total stock return indices in local currency, price, and annual December market capitalization are collected. Firms are required to have returns and positive market capitalizations. These stock returns and market capitalizations are converted to US dollars terms using monthly exchange rates obtained from the Federal Reserve Bank of St Louis's FRED system. [42] To reduce measurement errors, we follow Ince and Porter (2006) and Hou, Karolyi, and Kho (2009) and apply the extreme and reversal filters.[43] After these filters, there are 18,667 firms with returns.

The book-to-market equity (BM) ratio is calculated as common equity divided by market capitalization. We merge the BM ratio to the stock returns allowing for a six-month gap to allow time for the book equity information to be publicly available. The BM ratio is required to be positive and the top and bottom 1% of observations are considered outliers and dropped. After merging the BM ratio to monthly returns from

[41] http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html
[42] http://research.stlouisfed.org/fred2/
[43] Any return above 300% that is reversed within one month is considered as missing. Monthly returns above 400% are considered as missing. In other to exclude other outliers, monthly returns that fall out of the 0.5% and 99.5% percentile ranges in each country are dropped. Stocks that are less than 1 dollar per share in the previous month are dropped to minimize potential bias from penny stocks. We also drop extremely small firms with less than 1,000 dollar market capitalization.

Datastream, we are left with 15,930 individual stocks. We use these stocks in constructing BM portfolios and Fama-French three factors while we include stocks without the BM ratios in constructing market aggregate and size portfolios. Value-weighted market aggregate, 10 size, and 10 book-to-market ratio portfolios are constructed for the analyses. There are at least 10 firms in each portfolio to ensure reliable average returns. We extract dividend payments associated value-weighted portfolios following Campbell and Shiller (1988) and calculate dividend growth rates following Bansal, Dittmar and Lundblad (2005).

For international market, we form portfolios and construct Fama-French three factors from individual stock data from Datastream. Firms are sorted in each country based on book-to-market equity values from the preceding December and market capitalizations as of June 30 for each year and each country. Following Fama and French (1993), we construct 2x3 size and book-to-market portfolios.[44] To compute the excess market returns, we use the one-month Treasury bill rate from Ibbotson Associates as the risk free rate. The world portfolio returns and world Fama-French three factors are defined as the weighted average with the real U.S. GDP across our sample countries. All variables are in real term as nominal values minus inflation rates. Finally, real annualized portfolio returns and Fama-French three-factors are constructed for returns with dividend and without dividend.

[44] Firms are classified as small (S) if its size is below median or big (B) if it is above median in the country in each year. Low, medium, and high book-to-market firms (L, M, H) are in the bottom 30%, middle 40%, and the highest 30% book-to-market buckets. We form six portfolios with two size and three book-to-market classifications, SL, SM, SH, BL, BM, and BH.44 The domestic return variable, SMB is calculated with the formula (SH+SM+SL-BH-BM-BL)/3 for each month and HML as (SH+BH-SL-BL)/2 for each month.

3.2 Econometric Methodology

3.2.1 Recovering consumption dynamics via predictive regressions

Unobservable long-run component (x_t) and volatility component (σ_t^2) can be extracted from consumption data. Following similar methodologies in Bansal, Kiku, and Yaron (2007), we begin with Campbell and Shiller (1988) returns approximation that log market price-to-dividend ratios (logPD) and real risk free rates (RF) are linearly related to x_t and σ_t^2. Thus, log market price-to-dividend ratio and real risk free rates can be reliable candidates for predictors. Predicted long-run component is measured from the consumption growth regression allowing the MA(1) error structure. The MA(1) structure absorbs short-run persistence induced by time averaging of consumption data.

$$g_{t+1} = a_1 + b_1 \log PD_t + c_1 RF_t + d_1 e_t + e_{t+1} \tag{12}$$

The predicted long-run component, $\hat{x}_t$, is the estimated value excluding the MA(1) term from the regression above. We use the estimated consumption growth from the regression as a proxy for consumption variance. Using the consumption variance, we predict the volatility component, $\hat{\sigma}_t^2$.

$$\begin{aligned} \hat{\tilde{\sigma}}_{t+1}^2 &= (g_{t+1} - g_{t+1})^2 \\ \hat{\sigma}_{t+1}^2 &= a_2 + b_2 \log PD_t + c_2 RF_t + u_{t+1} \end{aligned} \tag{13}$$

Parameter values and shocks in consumption dynamics in eq (4) are recovered from both predictive regressions and data, i.e., μ_c is the mean of consumption growth. ρ and ν are coefficients of the AR(1) processes, φ is the standard deviation of residuals from the consumption growth regression divided by the standard deviation of residuals from $\hat{x}_t$'s AR(1) process.[45] σ_w is the standard deviation of residuals from

[45] Because of annual frequency data, we allow for an MA innovation structure when modeling the dynamics of annual growth rates following Bansal, Kiku, and Yaron (2007). The annual version of the

$\hat{\sigma}_t^2$'s AR(1) process. Time-varying short-run, long-run, and volatility shocks (or risks) are measured by residuals from the consumption regression and AR(1) processes.

3.2.2 Cross-Sectional Regressions

Campbell and Shiller (1988) show that returns for each asset are a linear combination of log price to dividend ratio and dividend growth rates.

$$\begin{aligned} r_{i,t+1} &\approx \kappa_{0,i} + \kappa_{1,i} z_{i,t+1} - z_{i,t} + g_{d,i,t} \\ z_{i,t} &= A_{i,0} + A_{i,1} x_t + A_{i,2} \sigma_t^2 \end{aligned} \tag{14}$$

Expected returns are linear functions of $\hat{x}_t$ and $\hat{\sigma}_t{}^2$ plus dividend growth rates ($g_{d,i,t}$). We regress each asset returns on $\hat{x}_t$ and $\hat{\sigma}_t{}^2$ and obtain expected returns as the estimated values from the regression plus dividend growth rates. The innovations in returns are realized returns minus the expected returns.

$$u_{i,t+1} = r_{i,t+1} - E_t r_{i,t+1} \tag{15}$$

$\hat{\beta}_{\eta,i}$, $\hat{\beta}_{e,i}$, and $\hat{\beta}_{w,i}$ are the covariations of the innovation in asset *i* returns with respect to the short-run risk, long-run risk, and volatility risk source, respectively.

$$\widehat{\widehat{\widehat{\beta}}}_{\eta,i} \equiv \frac{Cov\left(u_{r,i,t+1}, \eta_{t+1}\right)}{Var(\eta_{t+1})}, \beta_{e,i} \equiv \frac{Cov\left(u_{r,i,t+1}, e_{t+1}\right)}{Var(e_{t+1})} \text{and } \beta_{w,i} \equiv \frac{Cov\left(u_{r,i,t+1}, w_{t+1}\right)}{Var(w_{t+1})} \tag{16}$$

Cross-sectional regressions show whether the LRR betas capture the cross-sectional differences in average returns. We employ 21 assets including the aggregate market, 10 size, and 10 book-to-market sorted portfolios for each country.

$$\overline{r}_i^e = \lambda_0 + \lambda_\eta \widehat{\widehat{\widehat{\beta}}}_{\eta,i} + \lambda_e \beta_{e,i} + \lambda_w \beta_{w,i} + \varepsilon_i \tag{17}$$

where $\overline{r}^e$ is the average of excess returns.

equation (4) is $g_{t+1} = \mu_c + x_t + \alpha\sigma_{t-1}\eta_t + \sigma_t\eta_{t+1}$. Predictable variations in consumption growth are driven by the long-run risk component, x_t, and past consumption innovation, $\sigma_{t-1}\eta_t$. α is the coefficient. The annual model is described in Appendix A1.

3.2.3 GMM estimation

The parameters, RA and IES, are estimated using standard generalized method of moments (GMM) procedure. Parameter values in the consumption dynamics are obtained from the predictive regressions. In equation (5), returns on the aggregate portfolio with κ_0 and κ_1 are calculated during the sub-iteration in the minimization of the GMM.[46]

$$\begin{aligned} \kappa_1 &= \frac{\exp(\bar{z})}{(1+\exp(\bar{z}))} \\ \kappa_0 &= \log(1+\exp(\bar{z})) - \kappa_1 \bar{z} \end{aligned} \tag{18}$$

where $\bar{z}$ is the mean of the log price-consumption ratio. The log price-consumption ratio becomes a fixed point problem with its mean value, $\bar{z}$. We add $A_3 \sigma_t \eta_{t+1}$ in the log price-consumption linear relation in order to adjust annual frequency data.

$$\bar{z} = A_0(\bar{z}) + A_1(\bar{z})\bar{x} + A_2(\bar{z})\bar{\sigma}^2 + A_3(\bar{z})\overline{\sigma\eta} \tag{19}$$

4. Results

In this section, we verify whether the value premium can be explained by the LRR model internationally. First, we provide empirical evidence that the value premium is observed in international data. Second, we examine if extracted LLR factors can explain the observed value premium under the market integration assumption as well as under the market segmentation assumption. Third, we conduct

[46] We solve the fixed point problem in the minimization of the GMM. The nonlinear GMM system is sensitive to initial values. Thus, we repeat the two-step GMM estimation at least 10 times with different initial values. Initial values of RA range from 1 to 10, and initial values of IES range from 1 to 20. In the first step, the fixed point problem and the minimization problem of the objective function are solved subsequently. With the estimated values from the minimization process, the fixed point problem is solved again. The whole steps are repeated until the optimal values are reached.

Table 4.2: Summary Statistics of Stock Portfolio Returns

This table shows mean and standard deviation of stock portfolio returns for each country. Value-weighted market returns, portfolio deciles based previous year's book-to-market ratios (BM), and portfolio deciles based on previous year's market values (size) are constructed. Numbers in the parenthesis are standard deviations. Low is the lowest BM portfolio returns, while High is the highest BM portfolio. Small is the smallest and Large is the largest size portfolio returns. World is the real GDP value-weighted average.

Country	Sample Period	Market	Book-to-Market			Size		
			Low	High	High-Low	Small	Large	Small-Large
Australia	1984-2008	8.1	3.9	20.6	16.7	15.4	8.9	6.5
		(25.6)	(30.1)	(28.5)		(39.9)	(21.3)	
Austria	1991-2008	9.2	-1.8	3.2	5.0	-1.9	5.8	-7.7
		(29.1)	(26.9)	(29.0)		(16.9)	(19.8)	
Belgium	1986-2008	8.7	15.0	17.6	2.6	3.9	9.3	-5.3
		(25.1)	(31.9)	(25.3)		(14.2)	(23.5)	
Canada	1981-2008	6.1	4.2	12.7	8.5	20.8	6.6	14.2
		(19.2)	(32.5)	(27.0)		(28.7)	(19.3)	
Denmark	1989-2008	6.7	9.2	16.1	6.9	5.9	7.9	-2.1
		(24.8)	(23.2)	(30.0)		(14.6)	(17.4)	
Finland	1991-2008	8.2	29.9	12.1	-17.7	5.0	14.5	-9.6
		(26.2)	(60.0)	(30.0)		(15.3)	(34.5)	
France	1982-2008	9.9	10.4	17.0	6.7	25.6	11.3	14.3
		(29.3)	(27.9)	(30.7)		(46.2)	(24.6)	
Germany	1982-2008	8.4	8.0	17.8	9.8	13.4	8.9	4.5
		(24.3)	(31.0)	(37.3)		(26.0)	(25.8)	
Italy	1987-2008	5.5	0.1	9.5	9.5	8.0	3.4	4.6
		(37.4)	(20.0)	(32.6)		(21.4)	(21.2)	
Japan	1981-2008	9.3	1.6	17.4	15.8	18.1	10.4	7.7
		(27.7)	(29.0)	(29.7)		(34.7)	(28.5)	
Netherlands	1982-2008	11.7	17.1	18.2	1.1	7.6	12.4	-4.8
		(18.5)	(28.3)	(45.2)		(20.9)	(19.1)	
Norway	1986-2008	5.6	9.2	14.8	5.6	2.1	7.3	-5.3
		(25.3)	(39.8)	(48.0)		(16.2)	(23.9)	
Spain	1990-2008	7.0	1.9	16.3	14.4	4.6	9.3	-4.6
		(20.5)	(29.2)	(27.9)		(22.0)	(23.6)	
Sweden	1983-2008	9.2	10.0	24.8	14.8	5.6	10.1	-4.5
		(26.9)	(39.8)	(47.5)		(26.4)	(27.9)	
Switzerland	1982-2008	9.9	9.2	9.1	-0.1	6.0	10.3	-4.3
		(22.0)	(30.4)	(20.8)		(19.6)	(23.0)	
U.K.	1981-2008	6.8	5.3	17.1	11.8	11.1	6.8	4.2
		(26.8)	(18.0)	(28.3)		(33.7)	(26.1)	
U.S.A	1930-2008	7.9	6.8	13.7	6.9	16.3	7.2	9.1
		(20.7)	(22.2)	(33.6)		(41.1)	(19.6)	
World	1981-2008	8.5	5.8	15.3	9.4	12.2	8.5	3.6
		(18.2)	(19.0)	(20.3)		(20.0)	(17.7)	

the same empirical analysis only using macroeconomic information after 1950. The last part provides robust tests for main findings.

4.1 The Value Premium in International Data

Table 4.2 shows stock market, BM and size deciles portfolio returns. In all sample countries except Finland and Switzerland, the average returns of the highest BM portfolio minus the lowest BM portfolio are positive, which indicate that the value premium is pervasive. This pattern is consistent with Fama and French (1998)'s findings in our recent data sample.

4.2 Predictive Regressions

The LRR model introduces two channels in asset pricing: a long-run component in consumption and consumption volatility. One empirical issue is that they are not observable and should be extracted from the observed consumption and macroeconomic data. Bansal and Yaron (2004) use U.S. annual consumption data from 1928 to 1998 and verify that there exists a persistent economic growth component and economic uncertainty in the data. In this paper, we use long time-series consumption and macroeconomic data over 122 years in 16 countries.

Table 4.3 shows the regression results with the long-run data sample. The adjusted R-squared is around 20% in 10 countries, which implies the model fit in each country regression is acceptable.[47] In the long-run component estimation, the coefficients of logPD in all countries have expected signs, confirming that logPD is a predictor of consumption growth. The MA(1) components are positively and statistically significant at the 10% level in 11 countries and the world market (or the

[47] In the long-run sample regressions, the log price-dividend ratios (logPD) are not reported before 1950 in some countries, such as Norway (see Table I). In such cases, the world logPD from 1925 to 2008 is used.

value-weighted average).[48] In 4 countries, real risk free rates (RF) are positively significant at the 5% level. In unreported results, we also run regressions without RF as an explanatory variable and find that the impact of RF on adjusted R-squared is small. The results show that the extracted long-run component mainly comes from logPD while RF plays only a minor role. The highest adjusted R-squared is 38 % (UK). We measure consumption volatility in the second regression. Similar to the long-run component estimation, coefficients of logPD in all countries except for Belgium have expected signs. The adjusted R-squared is not higher than 12%, which implies that the predictability of investors for expected volatility is low. The expected consumption volatility through the long-run component is not highly predictable. The results in Table 4.3 clearly confirm that our predictive regressions can recover the consumption dynamics described in the model. [49]

4.3 Long-Run Risks and Stock Returns

The next question is whether predicted long-run and volatility components are related to the value premium. Short-run, long-run, and volatility betas are the covariance between innovations in asset returns and innovations in each shock as in equation (16). Under the long-run risks model, stock returns are positively correlated to short-run and long-run shock which represent fluctuating transitory consumption growth and fluctuating economic persistence. Stock returns should be negatively correlated to volatility shock, which is fluctuating economic uncertainty (or

[48] We try specifications that employ 10 year government bond yields and 3 month Treasury bill yields as risk free rates. Both specifications give similar qualitative results but specification with 10 year government bond yields has better performance. We report 10 year bond yield results in Table III.
[49] We also use data for nondurables for G7 countries obtained from Carroll, Slacalek, and Sommer (2009) and show that longer total private consumption growth can provide as good as or better results than using shorter nondurables.

Table 4.3: Predictive Regressions in Recovering Consumption Dynamics

This table shows the predictive regressions in recovering consumption dynamics with long-run macroeconomic data sample: Long-run component estimation and volatility component estimation. Start is the beginning year of the analysis and logPD, RF, and MA(1) are independent variables and the consumption growth rates (g_t) is a dependent variable. Numbers in parenthesis are t-statistics. "**" indicates t-statistics significant at 5% and "*" indicates t-statistics significant at 10%. Each estimated component follows AR(1) process . ρ is the AR(1) coefficient of long-run component and ν is the AR(1) coefficient of volatility component. The last row counts the number of countries with correct coefficient signs.

$$g_t = a_1 + b_1 \log PD_t + c_1 RF_t + d_1 e_t + e_{t+1}$$

$$\tilde{\sigma}_{t+1} = (g_{t+1} - \hat{g}_{t+1})^2 \text{ and } \tilde{\sigma}_{t+1} = a_2 + b_2 \log PD_t + c_2 RF_t + u_{t+1}$$

Country	Start	Long-Run Component Estimation (x_t)							Volatility Component Estimation (σ_t^2)					AR(1)	
		logPD		RF		MA(1)		Adj. R^2	logPD		RF		Adj. R^2	ρ	ν
Australia	1902	0.06	(1.68)*	-0.18	(-1.92)*	0.15	(1.53)	0.09	-0.44	(-2.36)**	1.56	(1.62)	0.05	0.84	0.67
Austria	1925	0.01	(0.46)	-0.33	(-0.97)	0.26	(1.31)	0.19	-0.13	(-2.15)**	1.17	(0.92)	0.08	0.93	0.77
Belgium	1927	0.01	(0.76)	-0.17	(-3.26)**	0.39	(3.66)**	0.18	-0.03	(-1.81)*	0.09	(0.48)	0.02	0.94	0.83
Canada	1925	0.02	(1.30)	0.00	(0.05)	0.60	(6.29)**	0.28	-0.14	(-3.68)**	0.16	(0.43)	0.12	1.00	0.87
Denmark	1925	0.01	(0.32)	0.23	(1.43)	0.09	(1.06)	0.03	-0.26	(-1.04)	-3.57	(-1.84)*	0.03	0.83	0.64
Finland	1925	0.02	(0.71)	-0.06	(-1.09)	0.25	(2.68)**	0.12	-0.23	(-1.63)	0.25	(0.53)	0.01	0.95	0.83
France	1931	0.03	(0.87)	-0.03	(-0.23)	0.48	(7.78)**	0.36	-0.12	(-0.24)	-3.27	(-1.61)	0.02	0.94	0.78
Germany	1924	0.02	(1.29)	0.04	(0.23)	0.22	(2.17)**	0.11	-0.09	(-1.44)	-0.26	(-0.23)	0.00	0.91	0.60
Italy	1925	0.03	(3.24)**	0.00	(0.04)	0.57	(5.20)**	0.29	0.04	(0.65)	-0.79	(-2.26)**	0.07	0.91	0.63
Japan	1886	0.00	(0.07)	0.05	(0.49)	0.52	(6.73)**	0.29	-0.19	(-1.70)*	-4.74	(-3.09)**	0.08	0.97	0.44
Netherlands	1925	0.03	(0.50)	0.20	(0.73)	0.38	(1.87)*	0.24	-0.42	(-0.99)	-10.27	(-2.42)**	0.07	0.91	0.53
Norway	1925	0.01	(1.15)	-0.00	(-0.03)	0.13	(1.18)	0.03	-0.05	(-1.61)	0.06	(0.29)	0.01	1.00	0.90
Spain	1925	0.03	(0.79)	-0.19	(-1.33)	0.27	(1.46)	0.07	-0.22	(-0.81)	2.70	(1.48)	0.01	0.93	0.59
Sweden	1925	0.01	(0.59)	0.09	(0.71)	0.21	(1.59)	0.04	-0.09	(-1.50)	0.07	(0.11)	0.01	0.99	0.91
Switzerland	1925	0.02	(1.64)	0.21	(1.69)*	0.45	(5.32)**	0.25	-0.08	(-2.48)**	0.71	(2.07)**	0.10	0.94	0.81
U.K.	1933	0.02	(1.47)	0.28	(4.15)**	0.46	(3.83)**	0.38	-0.02	(-0.50)	-0.85	(-2.52)**	0.08	0.89	0.50
U.S.A	1930	0.02	(2.08)**	-0.04	(-1.03)	0.48	(3.46)**	0.22	-0.04	(-2.08)**	0.18	(0.87)	0.03	1.00	0.84
World	1925	0.02	(1.93)*	0.00	(0.01)	0.19	(2.07)**	0.09	-0.06	(-2.91)**	-0.02	(-0.14)	0.07	1.00	0.90
# of Exp. Signs		18 (positive)		9 (negative)		18 (positive)			17 (negative)		10 (positive)				

Table 4.4: Global LRR Betas and Cross-Section Regressions

This table shows long-run betas and pricing-errors from cross-section regressions. Specification (1), LRR Betas and BM Portfolios, shows the short-run, long-run, and volatility betas of BM portfolios. Short-run beta is calculated as the covariance between the innovations in asset i returns and short-run risk divided by the variance of short-run risk. Long-run and volatility betas are calculated in the same way with respect to each risk. Low is the lowest BM portfolio and High is the highest BM portfolio. H-L indicates betas of High minus betas of Low. Specification (2), Cross-Sectional Regressions Comparison, shows the pricing errors from cross-sectional regressions of average returns in three asset pricing model: LRR Model is the long-run risk model, FF3 Model is Fama-French three-factor model, and CCAPM Model is the consumption-CAPM. Alpha is the constant in each regression meaning the pricing-errors. Numbers in parenthesis are t-statistics. "**" indicates t-statistics significant at 5% and "*" indicates t-statistics significant at 10%. The consumption dynamics for each country are recovered from the predictive regressions of the world in Table III.

	Specification (1): LRR Betas and BM Portfolios									Specification (2): Cross-Sectional Regressions Comparison					
	Short-Run Betas			Long-Run Betas			Volatility Betas			LRR Model		FF3 Model		CCAPM Model	
	Low	High	H-L	Low	High	H-L	Low	High	H-L	alpha	Adj R^2	alpha	Adj R^2	alpha	Adj R^2
Australia	7.20	7.77	0.57	5.85	4.27	-1.59	-1,257	-1,070	188	0.06 (1.43)	-0.02	0.03 (0.50)	0.31	0.10 (5.55)**	-0.05
Austria	0.04	5.00	4.97	-1.39	0.75	2.14	-1,151	-1,226	-74	0.02 (1.20)	0.50	-0.04 (-1.82)*	0.48	0.01 (1.28)	0.29
Belgium	18.65	11.76	-6.89	4.75	-0.20	-4.95	-1,236	-802	434	0.04 (1.62)	0.18	0.02 (0.75)	0.34	0.07 (3.64)**	0.13
Canada	13.77	6.64	-7.13	10.53	8.38	-2.15	-872	-2,116	-1,244	0.07 (2.02)*	0.61	-0.07 (-0.94)	0.23	0.16 (11.52)**	0.52
Denmark	12.25	7.89	-4.36	4.68	3.37	-1.31	-945	-2,095	-1,149	0.03 (1.87)*	0.59	0.05 (2.33)**	0.46	0.06 (3.60)**	0.06
Finland	48.26	11.21	-37.05	18.76	4.97	-13.79	3,777	-1,160	-4,937	0.03 (1.04)	0.60	0.01 (0.38)	0.51	0.06 (4.56)**	0.59
France	12.92	16.14	3.22	7.44	5.01	-2.43	-1,259	-1,408	-149	-0.01 (-0.32)	0.77	0.01 (0.25)	0.48	-0.01 (-0.71)	0.75
Germany	13.47	12.31	-1.16	6.04	4.55	-1.49	-1,178	-1,781	-604	0.06 (2.21)**	0.21	-0.04 (-1.03)	0.30	0.07 (2.70)**	-0.02
Italy	11.93	18.41	6.48	4.56	5.23	0.67	-635	-862	-227	-0.04 (-1.53)	0.34	0.03 (1.08)	0.16	-0.05 (-1.79)*	0.36
Japan	13.40	11.34	-2.06	7.93	5.96	-1.97	-466	-1,112	-646	0.08 (1.84)*	0.32	-0.08 (-1.65)	0.70	0.08 (1.64)	-0.02
Netherlands	13.29	15.73	2.45	6.11	6.30	0.19	-1,208	-2,721	-1,513	0.05 (1.55)	0.32	0.01 (0.36)	0.58	0.05 (1.36)	0.12
Norway	16.53	14.55	-1.98	8.97	9.96	0.99	-1,574	-2,105	-530	0.02 (1.16)	0.64	0.02 (1.15)	0.74	0.07 (4.06)**	0.14
Spain	9.55	0.21	-9.34	5.42	4.14	-1.28	-1,582	-1,337	245	-0.00 (-0.07)	0.04	-0.04 (-0.83)	0.18	0.07 (2.84)**	-0.05
Sweden	16.58	11.41	-5.18	13.73	10.12	-3.61	-1,286	-2,652	-1,366	0.03 (0.36)	0.26	-0.08 (-1.86)*	0.63	0.04 (0.60)	0.02
Switzerland	10.65	8.06	-2.58	4.46	2.93	-1.53	-1,421	-1,335	86	-0.00 (-0.20)	0.60	-0.01 (-0.38)	0.65	0.07 (2.15)**	0.00
U.K.	7.87	14.49	6.63	6.12	4.80	-1.32	-645	-753	-108	-0.01 (-0.57)	0.61	-0.03 (-0.76)	0.81	0.03 (1.94)*	0.42
U.S.A	2.15	4.45	2.30	7.17	11.21	4.04	-1,355	-2,596	-1,241	-0.02 (-1.46)	0.93	0.03 (1.33)	0.97	0.05 (3.10)**	0.39
World	2.75	4.51	1.76	7.67	11.13	3.47	-1,524	-2,590	-1,066	-0.01 (-0.36)	0.92	0.00 (0.12)	0.96	0.03 (2.16)**	0.60
# of Exp. Signs	18	18	8	17	17	6	17	18	14						

consumption volatility). Also, if value firms are riskier than growth firms, their exposure to each shock is higher than those of growth firms in absolute values.

Table 4.4 Specification (1) shows the main results of this paper. Under the market integration assumption, in most countries, low and high BM (or growth and value) portfolio returns are found to be positively correlated to short-run and long-run shocks and negatively correlated to volatility shock. The difference column (H-L) shows the betas of the value premium as it is the difference between the value portfolio beta and the growth portfolio beta. In 7 countries and the world (or the value-weighted average), short-run betas of value premiums are positive. In other 10 out of 17 countries, value premiums are not associated to short-run risk. The association of value premiums to long-run risk is even weaker as betas in only 5 countries and the world are positive. However, in 13 countries and the world, betas of value premiums are negative, which implies that value firms are more sensitive to fluctuating expected economic uncertainty than growth firms in most countries. The results for the U.S. are consistent with Kiku (2006) and Bansal, Kiku, and Yaron's (2007) findings. They find that short-run, long-run, and volatility betas of value premium are positive, positive, and negative, respectively. Interestingly, our results show that value premiums in countries outside the U.S. market are only associated to the volatility risk, but not to short-run and long-run risks. We find that value premiums arise internationally because value firms have higher exposure to volatility risk. In the next section, we examine the performance of estimated betas capturing cross-section differences of average returns across size and BM portfolios.

4.4 Cross-Sectional Regressions

The cross-sectional regression in equation (17) employs the estimated betas from the previous section in explaining the average returns of 21 assets in each country. [50] We also present performance of Fama-French three-factor model (FF3) and the Consumption Capital Asset Pricing Model (CCAPM) by Breeden (1979) for comparison.

Table 4.4 Specification (2) reports pricing errors (alphas) and adjusted R-squared from each model. The LRR model and the FF3 model produce statistically significant pricing errors in 4 and 3 countries, respectively, while the CCAPM has in 13 countries. This results show that the LRR betas can capture the cross-sectional differences in average returns as well as does the FF3 model.

Figure 4.1 plots all estimated and real average returns of 17 countries as well as the world from each regression in Table IV Specification (2). The R-squared on each graph is the correlation coefficient between estimated values versus real values across 21 assets of 17 countries and the world. The LRR plot shows 0.67, correlation coefficient and the FF3 plot shows 0.70. Overall, we find that the LRR betas can capture the cross-sectional differences just as well as the FF3 betas.

In Table 4.4, we find that short-run and long-run betas of value premium do not produce positive signs in more than half of the sample countries. Hence, we focus on the ability of each beta in capturing the cross-sectional differences of 21 assets. Figure 4.2 shows the univariate beta regression results for the U.S. and Japan. In these two countries, LRR betas explain the cross-section of average returns of 21 assets. However, each beta provides different results in the U.S. and Japan cases. For example, LR beta explains the cross-sectional differences in returns in the U.S. while it does not in Japan. We proceed with the same analysis for the remaining 15 countries. With all three LRR betas, most countries show that the differences in average returns can be explained, while, in SR, LR and VOL beta regressions, predicted excess returns are close to real excess returns in 10, 9, and 13 countries,

[50] The 21 assets are market, size deciles and BM deciles portfolios.

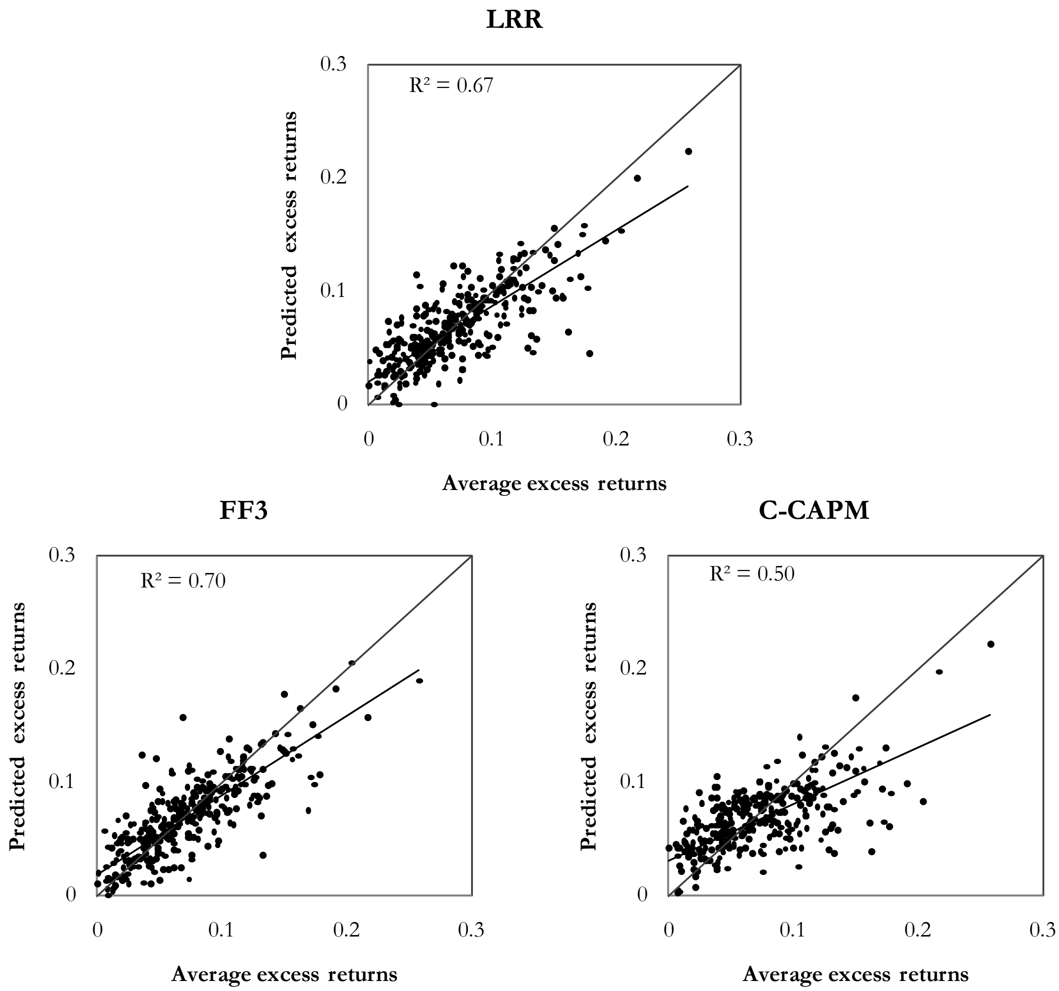
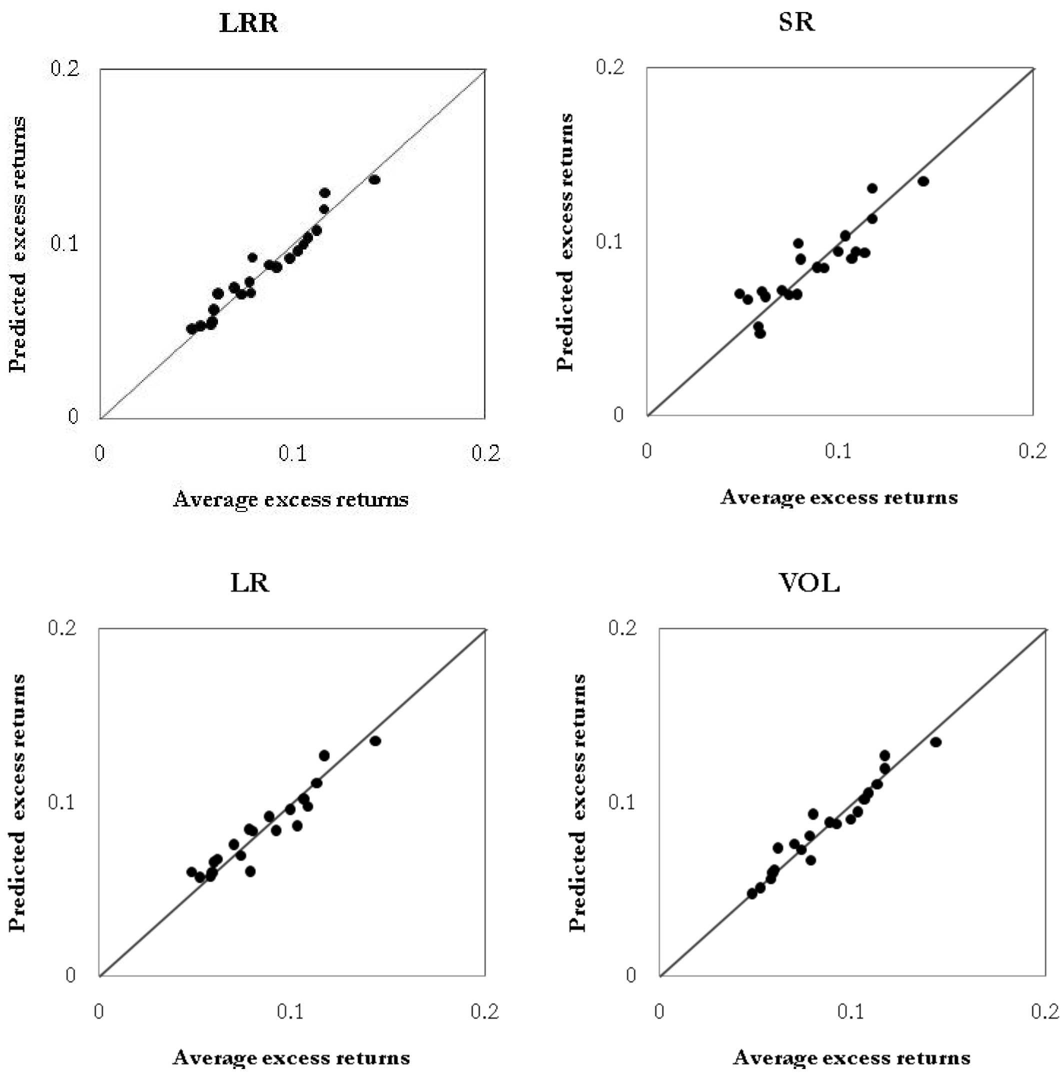


Figure 4.1: Pricing Errors Comparison the Cross-Section of Average Returns

This figure plots the predicted excess returns versus the real average excess returns in 17 countries as well as the world with 21 assets. For each country, three cross-section regressions are conducted: global LRR model, Fama-French three-factor model (FF), and the consumption-CAPM (C-CAPM). The predicted excess returns are plotted and the average real excess returns are plotted on the x-axis. The displayed R^2 is from a univariate regression with the predicted excess returns on the average excess returns which are the line that is close to diagonal.

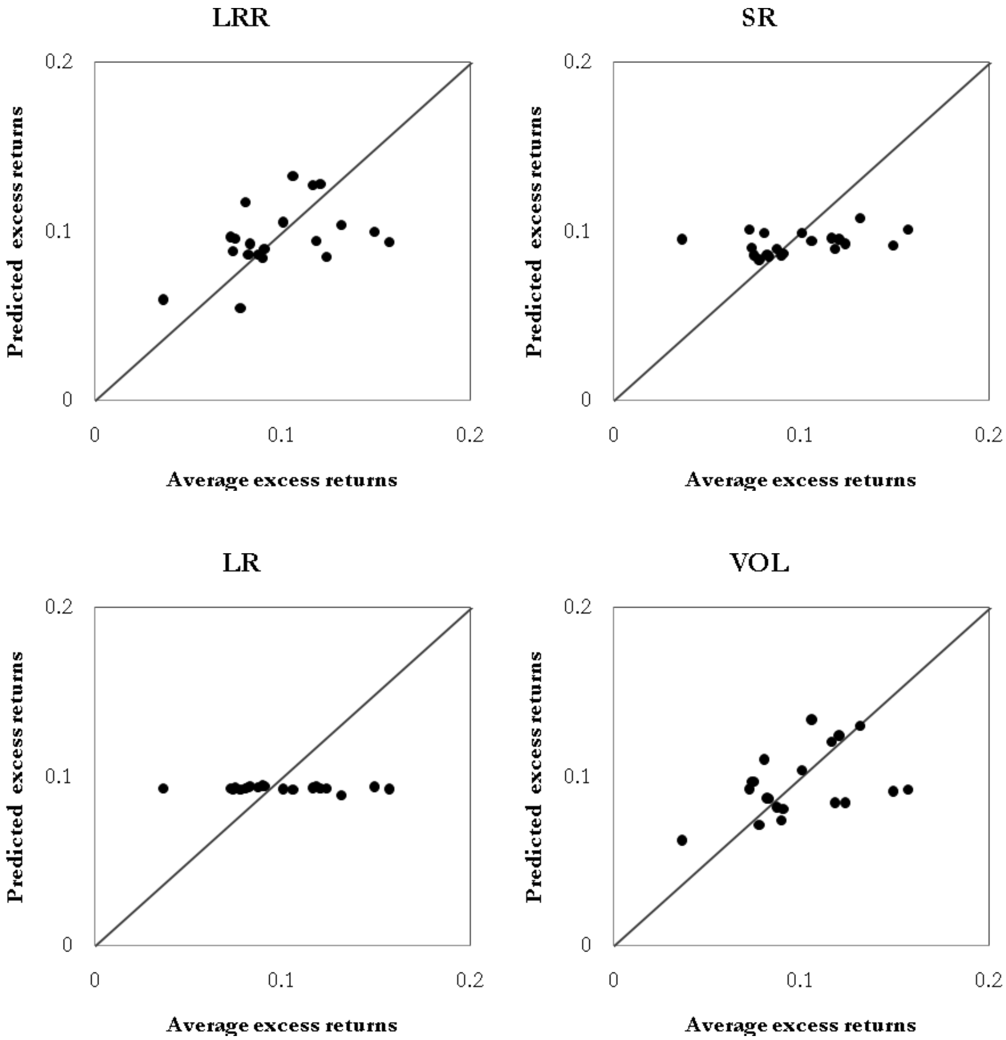


The U.S. Sample

Figure 4.2: Pricing Errors of Average Returns

This figure plots the predicted excess returns versus the real average excess returns with 21 assets in each country. LRR is the cross-sectional regression results using three LRR betas, SR is the results with short-run beta, LR is the results with long-run beta, and VOL is the results with volatility beta, The predicted excess returns are plotted and the average real excess returns are plotted on the x-axis. The displayed R^2 is from a univariate regression with the predicted excess returns on the average excess returns which are the line that is close to diagonal.

Figure 2 (continued)



The Japan Sample

respectively. In particular, single LR beta regressions in G7 countries except for the U.S produce flat scatter plots similar to Japan, which implies that in G7 countries except for the U.S. the LR beta does not have a role in the cross-sectional differences in average returns.

4.5 GMM Estimation

In the previous sections, we have discussed betas, sensitivities of innovations of returns to LRR shocks, and the ability of those betas in capturing the cross-sectional variation of average returns. In this section, we examine whether the LRR model produces the positive implied value premium. First, RA and IES are estimated using the general method of moments (GMM). Second, these estimated RA and IES together with parameters from predictive regressions produce the model derived market price of risk for each shock in equation (10). Then, the implied risk premium for each asset can be obtained as in equation (10) when betas are obtained from the previous sections.

4.5.1 RA and IES Estimation

In this section, the RA and IES are estimated using the Euler equation approach. The time discount rate, δ, is a constant value, 0.987. Parameter values of μ_c, α, ρ, φ, ν, $\bar{\sigma}^2$, and σ_w and $\sigma_t\eta_{t+1}$, $\sigma_t e_{t+1}$, and $\sigma_w w_{t+1}$ are obtained from predictive regressions in the previous section. Test assets are risk-free rate, market, the smallest and the largest size portfolios, and the lowest and the highest BM portfolios.

In Table 4.5, Panel A shows the average of parameter values across 17 countries and the world at large using the long-run data sample. On average, ρ and ν

Table 4.5: Sensitivities of Parameter Values

This table displays characteristics of parameters from consumption dynamics and reasonable lower and upper bound of RA and IES. Panel A presents the average of estimated parameter values across 17 countries and the world using the long-run data sample. The reported values of σ_w and $\bar{\sigma}^2$ are multiplied by 100 for display. BY04 is the parameter values used in Bansal and Yaron (2004) simulation. Panel B shows the sensitivities of A1 and A2 values to the changes of RA and IES. In this table, we obtain other necessary coefficients from each country model using long-run data sample. The log price-consumption ratio is a linear function of long-run and volatility components. A1 is the coefficient of long-run component which implies the elasticity of the log price-consumption ratio to long-run component. A2 is the coefficient of volatility component which implies the elasticity of the log price-consumption ratio. The first and the second sets of columns show the variations of A1 and A2 as RA varies from 0.5 to 10 and IES varies from 0.5 to 10. "-" indicates that the simulation is not converged with the assigned RA and assigned IES.

Panel A: Average of Parameter Values

	μ_c	α	ρ	φ	σ_w	ν	$\bar{\sigma}^2$
Mean	0.020	0.338	0.938	0.199	0.080	0.725	0.151
(s.d.)	(0.004)	(0.162)	(0.052)	(0.098)	(0.096)	(0.150)	(0.123)
BY04	0.0015	-	0.979	0.044	0.023	0.987	0.780

Panel B: Sensitivities of A1 and A2

	Elasticity to Long-Run Component (A1)									Elasticity to Volatility Component (A2)								
RA	RA=0.5			RA=2			RA=10			RA=0.5			RA=2			RA=10		
IES	0.5	2	10	0.5	2	10	0.5	2	10	0.5	2	10	0.5	2	10	0.5	2	10
Australia	-5.30	3.05	-	-5.44	3.01	5.53	-	2.79	4.89	-2.13	1.39	-	4.47	-2.71	-5.07	-	-21.05	-36.15
Austria	-9.16	6.59	-	-9.61	6.27	11.80	-	5.09	8.76	-7.84	8.75	-	17.41	-15.69	-31.14	-	-88.88	-145.05
Belgium	-10.36	8.18	-	-10.71	7.81	15.02	-	6.62	11.65	-14.12	20.16	-	30.48	-36.31	-76.12	-	-223.29	-381.52
Canada	-15.77	-	-	-16.40	47.10	86.84	-	16.59	28.07	-6.88	-	-	14.56	-194.33	-367.43	-	-217.53	-348.45
Denmark	-4.99	2.80	-	-5.07	2.77	5.09	-	2.63	4.65	-1.36	0.81	-	2.78	-1.60	-2.98	-	-13.22	-23.21
Finland	-9.53	-	-	-10.21	9.34	17.72	-	6.18	10.49	-5.18	-	-	11.85	-20.84	-42.01	-	-78.36	-124.99
France	-9.76	-	-	-11.03	7.19	13.43	-	4.29	6.91	-3.65	-	-	8.63	-6.46	-12.34	-	-27.87	-44.06
Germany	-7.60	-	-	-7.76	5.79	-	-9.19	5.24	9.55	-1.68	-	-	3.45	-3.21	-	39.71	-24.45	-44.86
Italy	-7.39	-	-	-7.65	5.36	-	-	4.53	7.92	-3.63	-	-	7.68	-7.01	-	-	-46.31	-79.10
Japan	-13.22	14.39	-	-14.85	12.44	24.21	-	7.55	12.00	-1.25	1.26	-	2.70	-2.12	-4.19	-	-12.26	-20.41
Netherlands	-8.34	5.55	-	-9.03	5.28	9.75	-	4.08	6.78	-1.66	1.20	-	3.66	-2.24	-4.18	-	-14.61	-24.05
Norway	-15.80	-	-	-16.04	81.15	152.35	-47.54	28.33	49.37	-4.18	-	-	8.55	-392.22	-769.47	565.96	-404.84	-682.06
Spain	-8.17	-	-	-8.65	6.32	12.01	-	4.89	8.36	-2.37	-	-	5.20	-5.12	-10.19	-	-28.79	-47.43
Sweden	-14.19	-	-	-14.58	30.80	59.26	-	14.63	25.19	-7.36	-	-	15.47	-160.77	-333.63	-	-292.22	-478.07
Switzerland	-10.69	8.55	-	-11.22	8.06	15.31	-	6.44	11.11	-9.46	12.75	-	20.87	-22.48	-45.44	-	-125.14	-206.28
U.K.	-7.03	4.64	-	-7.23	4.53	8.50	-	4.05	7.14	-5.89	5.34	-	12.53	-10.13	-19.91	-	-71.82	-123.44
U.S.A	-19.39	-	-	-20.70	41.52	75.38	-	16.47	27.52	-17.09	-	-	38.97	-348.11	-637.70	-	-457.03	-704.60
World	-19.11	-	-	-19.80	51.76	96.22	-	19.46	33.06	-11.83	-	-	25.43	-412.79	-794.75	-	-471.46	-750.21
# of Exp. Signs	0	8	0	0	18	16	0	18	18	18	0	0	0	18	16	0	18	18

Table 4.6: Global LRR Model Estimation

This table presents the GMM estimation results of the global LRR model using long-run data sample. Panel A shows estimated RA and IES from the two-step GMM minimization for each country. State variables, shocks, and parameters are recovered from predicted regressions in Table III using long-run data sample. The time discount rates are 0.987. The identify matrix is used as initial weighting matrix and in the second stage, the optimal weighting matrix is used. The search direction algorithm is the Steepest Descent method. The SDF is based on the annual Bansal, Kiku, and Yaron (2007) model. Risk free rates, market, top and bottom size deciles, top and bottom BM deciles are selected for asset returns. The pricing errors report each asset's pricing errors from the LRR model. The bottom two lines report J-statistics and p-values for overidentifying restrictions. Numbers in parenthesis are Newey-West adjusted t-statistics with lag 1. "**" indicates t-statistics significant at 5% and "*" indicates t-statistics significant at 10%. Panel B shows implied risk premium for low and high BM portfolios. Numbers are unit. The total of implied RP is the sum of short-run, long-run and volatility RP. Data is the average of realized returns. Implied RP/Data is the percentage ratio that is explained by the LRR model of the realized data. Panel C is implied risk premium of high BM minus low BM RP.

Panel A: Two-Step GMM Estimation Results

		AUS	AUT	BEL	CAN	DNK	FIN	FRA	GER	ITA	JPN	NLD	NOR	ESP	SWE	CHE	GBR	USA	WLD
Parameters	RA	3.66	1.89	3.20	3.98	3.87	4.23	4.82	4.33	3.65	4.19	2.92	2.68	3.85	4.85	5.39	1.85	4.32	4.75
		(4.25)**	(1.60)	(2.94)**	(3.10)**	(2.67)**	(5.08)**	(4.88)**	(6.72)**	(3.14)**	(3.99)**	(5.06)**	(3.40)**	(2.44)**	(6.21)**	(5.81)**	(2.37)**	(7.71)**	(1.63)
	IES	4.85	4.67	1.72	9.12	3.69	2.09	2.05	1.93	3.00	2.12	1.35	2.33	2.63	2.83	1.77	11.06	2.03	5.23
		(0.23)	(0.28)	(0.63)	(0.07)	(0.20)	(0.25)	(0.37)	(0.49)	(0.27)	(0.44)	(0.39)	(0.38)	(0.28)	(0.23)	(0.35)	(0.04)	(0.56)	(0.67)
	RF	0.23	0.01	0.10	0.10	0.31	-0.08	0.12	0.04	0.07	0.03	-0.05	0.12	0.29	0.14	0.10	0.05	0.09	0.19
Pricing Errors		(5.96)**	(0.06)	(1.13)	(23.64)**	(2.23)**	(-1.03)	(0.60)	(0.27)	(0.53)	(0.22)	(-0.22)	(0.82)	(1.77)*	(0.47)	(0.56)	(0.14)	(0.87)	(0.10)
	Market	0.20	0.05	0.11	0.04	0.30	-0.01	0.11	0.06	0.03	-0.04	0.01	0.16	0.24	0.02	0.10	0.06	0.04	0.12
		(3.28)**	(0.34)	(1.27)	(1.55)	(2.10)**	(-0.16)	(0.60)	(0.36)	(0.31)	(-0.55)	(0.07)	(1.25)	(1.77)*	(0.09)	(0.66)	(0.17)	(0.71)	(0.11)
	Small Size	0.13	-0.02	0.12	0.12	0.33	-0.04	0.26	0.19	0.13	0.06	-0.02	0.15	0.18	0.03	0.10	0.01	0.06	0.08
		(1.71)	(-0.14)	(1.36)	(2.79)**	(2.48)**	(-0.41)	(1.12)	(0.86)	(1.02)	(0.53)	(-0.07)	(0.93)	(1.58)	(0.16)	(0.59)	(0.02)	(1.03)	(0.10)
	Large Size	0.20	0.06	0.10	0.05	0.29	0.00	0.12	0.05	0.02	-0.05	0.01	0.16	0.27	0.00	0.11	0.06	0.04	1.81
		(3.14)**	(0.39)	(1.34)	(1.67)	(2.07)*	(0.05)	(0.63)	(0.30)	(0.21)	(-0.70)	(0.08)	(1.35)	(1.83)*	(0.02)	(0.68)	(0.18)	(0.69)	(1.84)*
	Low BM	0.17	0.01	0.13	-0.01	0.29	0.12	0.08	0.02	0.00	-0.11	0.02	0.11	0.13	-0.07	0.09	0.00	0.04	1.91
		(1.66)	(0.04)	(1.30)	(-0.12)	(1.76)*	(1.08)	(0.44)	(0.12)	(0.02)	(-1.61)	(0.10)	(1.54)	(1.16)	(-0.39)	(0.58)	(0.00)	(0.62)	(1.88)*
	High BM	0.32	0.05	0.25	0.03	0.36	0.00	0.26	0.13	0.11	0.05	-0.01	0.13	0.40	0.01	0.16	0.15	0.05	1.63
		(4.61)**	(0.32)	(2.12)**	(1.98)*	(2.93)**	(-0.02)	(1.02)	(0.69)	(0.85)	(0.55)	(-0.08)	(1.19)	(2.01)*	(0.06)	(1.14)	(0.42)	(0.70)	(1.34)
J-Statistics	Est.	42.72	26.64	19.53	16.24	9.58	12.87	23.51	47.17	30.34	129.31	29.33	2.09	46.00	33.29	16.22	106.87	2.02	5.60
	p-value	0.00%	0.00%	0.06%	0.27%	4.81%	1.19%	0.01%	0.00%	0.00%	0.00%	0.00%	71.97%	0.00%	0.00%	0.27%	0.00%	73.18%	23.08%

Note: Australia (AUS), Austria (AUT), Belgium (BEL), Canada (CAN), Denmark (DNK), Finland (FIN), France (FRA), Germany (GER), Italy (ITA), Japan (JPN), the Netherlands (NLD), Norway (NOR), Spain (ESP), Sweden (SWE), Switzerland (CHE), the United Kingdom (GBR), the United States (USA), and World (WLD)

Table 4.6 (continued)

Panel B: Implied RP Decomposition

		AUS	AUT	BEL	CAN	DNK	FIN	FRA	GER	ITA	JPN	NLD	NOR	ESP	SWE	CHE	GBR	USA	WLD
Low BM																			
Implied RP	Short-Run	0.003	0.000	0.008	0.012	0.006	0.025	0.011	0.011	0.007	0.027	0.007	0.006	0.004	0.014	0.011	0.003	0.004	0.005
	Long-Run	0.021	-0.004	0.014	0.065	0.016	0.064	0.039	0.033	0.021	0.075	0.024	0.026	0.018	0.074	0.027	0.032	0.076	0.086
	Volatility	0.031	0.014	0.023	0.022	0.024	-0.102	0.038	0.031	-0.003	0.065	0.017	0.025	0.039	0.039	0.048	0.008	0.032	0.040
	Total	0.055	0.010	0.045	0.099	0.046	-0.013	0.088	0.075	0.024	0.166	0.049	0.056	0.062	0.128	0.086	0.042	0.112	0.131
Data	Total	0.039	0.002	0.109	0.027	0.080	0.312	0.098	0.074	-0.014	0.014	0.163	0.130	0.008	0.084	0.094	0.027	0.079	0.071
Implied RP/Data	Total	143%	642%	41%	364%	58%	-4%	90%	102%	-174%	1205%	30%	43%	729%	152%	92%	157%	141%	186%
High BM																			
Implied RP	Short-Run	0.004	0.001	0.005	0.006	0.004	0.006	0.014	0.010	0.014	0.011	0.009	0.005	0.000	0.010	0.009	0.006	0.008	0.009
	Long-Run	0.016	0.002	-0.001	0.051	0.012	0.017	0.026	0.025	0.023	0.041	0.025	0.029	0.014	0.055	0.018	0.025	0.119	0.125
	Volatility	0.026	0.015	0.015	0.054	0.053	0.031	0.042	0.047	0.005	0.081	0.039	0.033	0.033	0.081	0.045	0.009	0.061	0.066
	Total	0.045	0.018	0.019	0.111	0.069	0.054	0.083	0.082	0.042	0.133	0.073	0.067	0.047	0.146	0.071	0.040	0.187	0.200
Data	Total	0.188	0.044	0.147	0.110	0.160	0.117	0.188	0.175	0.090	0.167	0.176	0.157	0.162	0.239	0.094	0.155	0.157	0.143
Implied RP/Data	Total	24%	40%	13%	102%	43%	46%	44%	47%	47%	80%	41%	43%	29%	61%	76%	26%	120%	140%

Table 4.6 (continued)

Panel C: Implied High-Low RP Decomposition

		AUS	AUT	BEL	CAN	DNK	FIN	FRA	GER	ITA	JPN	NLD	NOR	ESP	SWE	CHE	GBR	USA	WLD
Implied RP	Short-Run	0.000	0.001	-0.003	-0.006	-0.002	-0.019	0.003	-0.001	0.007	-0.015	0.001	-0.001	-0.004	-0.005	-0.003	0.003	0.004	0.003
	Long-Run	-0.006	0.006	-0.015	-0.013	-0.005	-0.047	-0.013	-0.008	0.003	-0.034	0.001	0.003	-0.004	-0.020	-0.009	-0.007	0.043	0.039
	Volatility	-0.005	0.001	-0.008	0.032	0.029	0.133	0.004	0.016	0.008	0.016	0.022	0.008	-0.006	0.042	-0.003	0.001	0.029	0.026
	Total	-0.010	0.007	-0.026	0.013	0.023	0.067	-0.006	0.007	0.018	-0.033	0.024	0.011	-0.015	0.018	-0.015	-0.003	0.076	0.069
	Short-Run	-3%	14%	11%	-48%	-9%	-29%	-50%	-14%	39%	47%	6%	-6%	30%	-25%	18%	-90%	5%	5%
	Long-Run	57%	74%	58%	-103%	-20%	-71%	231%	-119%	15%	102%	3%	27%	29%	-110%	62%	234%	57%	57%
	Volatility	45%	12%	31%	251%	129%	200%	-81%	233%	45%	-48%	91%	79%	41%	235%	19%	-45%	38%	38%
	Total	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Data	Total	0.149	0.043	0.037	0.082	0.080	-0.195	0.091	0.102	0.104	0.153	0.013	0.026	0.153	0.155	0.001	0.128	0.078	0.072
Implied RP/Data	Short-Run	0%	2%	-8%	-7%	-3%	10%	3%	-1%	7%	-10%	11%	-3%	-3%	-3%	-413%	2%	5%	5%
	Long-Run	-4%	13%	-40%	-16%	-6%	24%	-14%	-8%	3%	-22%	6%	11%	-3%	-13%	-1399%	-5%	55%	54%
	Volatility	-3%	2%	-22%	39%	37%	-68%	5%	16%	8%	10%	169%	32%	-4%	27%	-438%	1%	37%	36%
	Total	-7%	17%	-69%	15%	28%	-34%	-6%	7%	18%	-22%	186%	40%	-10%	11%	-2250%	-2%	97%	95%

are higher than 0.7, which implies an AR(1) process in long-run and volatility components. Estimated φ and $\bar{\sigma}^2$ are higher than Bansal and Yaron's (2004) predictions. Thus, in international data, the constants in long-run and volatility fluctuations are higher than what Bansal and Yaron (2004) expected.

In Table 4.5 Panel B, we check a reasonable set of upper and lower bounds for RA and IES. Mehra and Prescott (1985) argue that a reasonable upper bound for RA is 10. Moreover, in the LRR model, signs of A1 and A2 in the log price-consumption ratio equation are positive and negative when the IES is higher than one. The log price-consumption ratio is a linear function of long-run and volatility components. Higher expected growth yields the increase in the price-consumption ratio, while higher expected volatility leads to decreases in the price-consumption ratio. We test the economic plausibility of A1 and A2, as RA and IES vary. Panel B confirms that RA and IES should be below 10 and above 0.5.

A two-step GMM estimation is applied with asset returns for risk-free rates, the market, the smallest and largest size portfolios, the lowest and highest BM portfolios. Initial values of RA and IES are 0.5, 2, and 10. We report the global LRR model results using the long-run data sample in Table VI .

Table 4.6 Panel A presents estimated RA and IES, average pricing errors, and J-statistics from the GMM estimation of the global LRR model using the long-run data sample. Estimated RA and IES for the U.S. are 4.32 and 2.03, while Bansal, Kiku, and Yaron's (2007) estimated values are 15.12 and 0.50. Pricing errors of all assets are small and insignificant. Moreover, the model is not rejected, as J-statistics for overidentifying restriction are above 0.73. Overall, the results for the U.S. in this paper are comparable to those of Bansal, Kiku and Yaron (2007).[51] In all of sample

[51] This is probably because of the search method and different series of risk-free rates. We use 10 year government bond yields as risk free rates while Bansal et. al. (2007) use 3 month treasury bill yields. The GMM using the nonlinear objective function is sensitive to search direction algorithms. Our GMM

countries, estimated RAs are significant and range from 1.89 to 5.39, and thus are above 1 and below 10. Though estimated IESs are insignificant, the lowest value is 1.71, which is above one. The LRR model using the Euler equation approach produces illuminating results in the sense that RAs are in the reasonable range and statistically significant, and pricing errors are quite low though p-values of J-statistics in most countries are lower than 0.05.

4.5.2 Implied Value Premium

Equation (10) shows that implied risk premium can be decomposed into three parts: risk premium derived from short-run risk, long-run risk, and volatility risk. We calculate the market price of risk with respect to each risk as in equation (10) and Appendix 1. Betas measure the covariation between the innovations in asset returns and each shock (consumption news). The short-run conditionally implied risk premium of growth portfolio is the market price of a short-run risk multiplied by the short-run beta of the growth portfolio. The long-run and volatility risk premium of the growth portfolio use their betas.

Table 4.6 Panel B focuses on implied risk premium of a low BM portfolio (growth) and a high BM portfolio (value). It shows that the global LRR model explain 24%-140% of the risk premium in value portfolios. The corresponding number for growth portfolio ranges from -174% to 1205%, showing that the growth portfolio estimation is not stable.

procedure follows Michael T. Cliff's MINZ library at http://www.feweb.vu.nl/econometriclinks/mcliffprogs.html. We tried five different search algorithms (the steepest descent, compared to the Gauss-Newton, Levenberg-Marguardt, Davidon-Fletcher-Powell, and Broyden-Fletcher-Goldfarb-Shanno algorithms) in the estimation and decide on the steepest descent method.

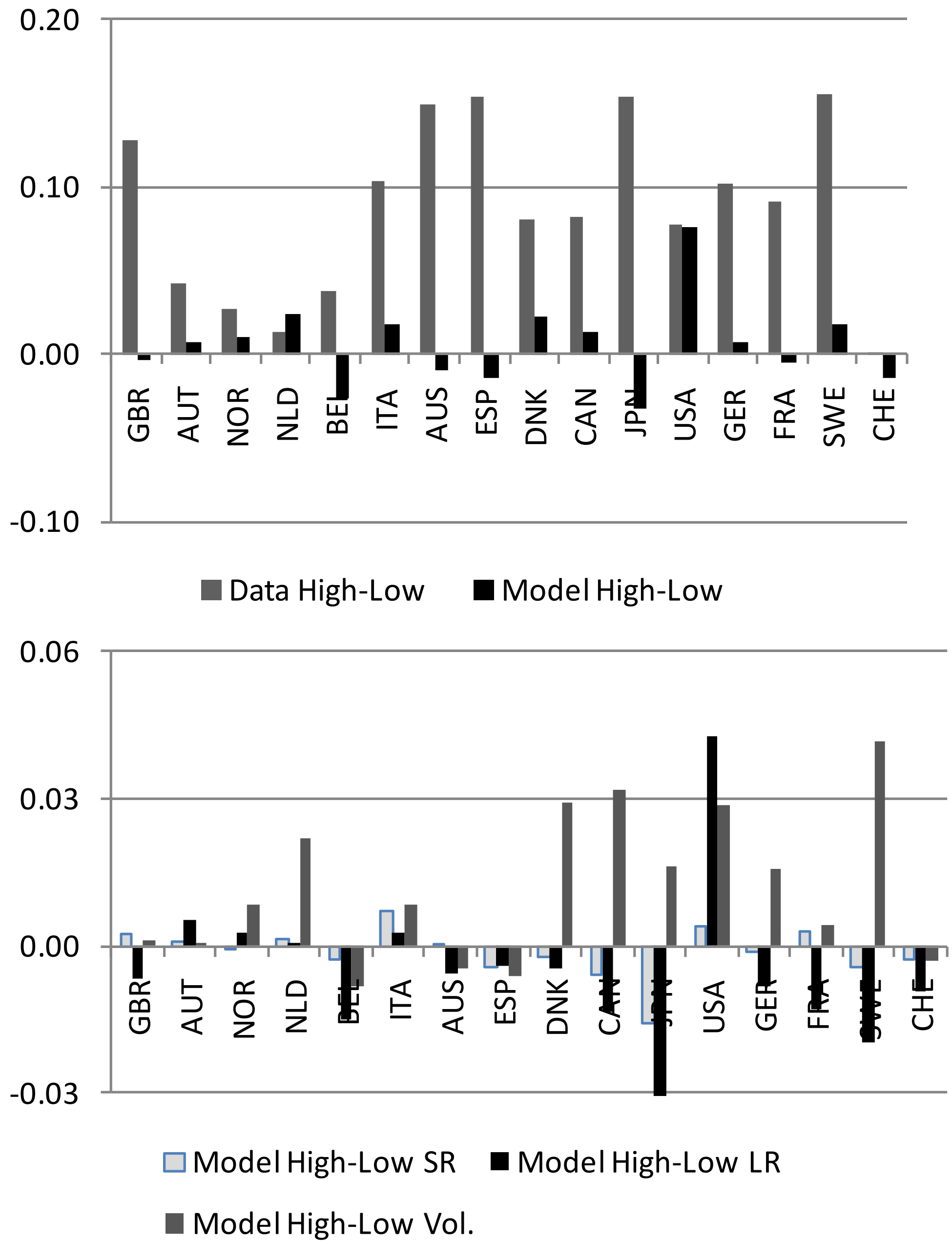


Figure 4.3: Risk Aversion and the Value Premium

This figure displays the implied value premium and its decompositions according to the order of estimated risk aversion parameters (RA). Panel A shows the implied risk premium (RP) of high - low BM portfolios (Model High-Low) and the real average of data (Data High-Low). Panel B decomposes the implied RP into three components: conditional RP by short-run, long-run, and volatility risks (Model High SR, Model High LR, and Model High Vol., respectively).

Table 4.6 Panel C is the difference between growth and portfolio estimation from Panel B. It asks whether the global LRR model can replicate the value premium that is pervasive throughout the world. 10 cases show that the conditionally implied high minus low BM portfolio produces positive signs. This is slightly more than half of the cases. This is related to the fact that LRR model is unstable in capturing growth portfolio risk premium. For example, in Japan, the growth portfolio is overestimated (1205%) while the value portfolio is well estimated (80%). Thus, the results imply that the value portfolio is related to a fluctuating economy and uncertainty in the LRR model framework. Overall, our findings confirm Zhang (2005)'s theoretical model in that value firms are riskier when the economy is in a bad condition. In the LRR model, value firms are required to provide higher risk premium when expected growth is low and economic uncertainty increases.

Figure 4.3 plots real and model-implied values with the order of RAs across countries for the low, high, and high-low BM portfolios. [52] It clearly shows that 9 countries have positive value premium under the LRR framework and the main source of the implied value premium is the volatility risk in those countries except for the U.S.

4.6 Long-Run vs. Short-Run Data

This section examines the issue of whether time span matters in the empirical test of the LRR model. In particular, the data should include a long enough time span to represent overall variations in the macro economy.

Predictive regressions to extract consumption dynamics are estimated using the short-run data sample results from 1950 to 2008. The results are in Table 4.7. If the long-run sample results provide better predicted values than short-run sample

[52] We take Finland as a outlier in the graphs since its real average value premium is around negative 30%.

Table 4.7: Predictive Regressions in Recovering Consumption Dynamics with Short-Run Data Sample

This table shows the predictive regressions in recovering consumption dynamics with short-run macroeconomic data sample: Long-run component estimation and volatility component estimation. Start is the beginning year of the analysis and logPD, RF, and MA(1) are independent variables and the consumption growth rates (g_t) is a dependent variable. Numbers in parenthesis are t-statistics. "**" indicates t-statistics significant at 5% and "*" indicates t-statistics significant at 10%. Each estimated component follows AR(1) process . ρ is the AR(1) coefficient of long-run component and ν is the AR(1) coefficient of volatility component. The last row counts the number of countries with correct coefficient signs.

$$g_t = a_1 + b_1 \log PD_t + c_1 RF_t + d_1 e_t + e_{t+1}$$

$$\tilde{\sigma}_{t+1} = (g_{t+1} - \hat{g}_{t+1})^2 \text{ and } \tilde{\sigma}_{t+1} = a_2 + b_2 \log PD_t + c_2 RF_t + u_{t+1}$$

Country	Start	Long-Run Component Estimation (x_t)							Volatility Component Estimation (σ_t^2)					AR(1)	
		logPD		RF		MA(1)		Adj R^2	logPD		RF		Adj R^2	ρ	ν
Australia	1950	0.01	(0.50)	0.16	(1.48)	0.15	(1.53)	0.14	-0.05	(-1.78)*	0.09	(0.50)	0.02	0.98	0.77
Austria	1950	-0.02	(-2.37)**	0.06	(0.40)	0.17	(0.94)	0.20	-0.05	(-1.76)*	0.28	(0.95)	0.03	0.98	0.70
Belgium	1951	0.00	(0.23)	-0.01	(-0.04)	0.29	(2.65)**	0.03	-0.03	(-1.64)	-0.19	(-0.63)	0.02	1.00	0.80
Canada	1950	0.01	(1.03)	-0.04	(-0.48)	0.48	(2.96)**	0.12	-0.04	(-1.94)*	0.02	(0.07)	0.04	1.00	0.91
Denmark	1950	0.00	(0.27)	0.08	(0.67)	0.19	(1.75)*	0.00	-0.01	(-0.35)	0.33	(1.20)	-0.01	0.99	0.54
Finland	1950	0.01	(0.28)	-0.18	(-1.39)	0.78	(6.06)**	0.30	-0.05	(-0.85)	0.27	(0.54)	-0.02	0.96	0.86
France	1950	0.01	(0.84)	-0.12	(-2.53)**	0.35	(1.90)*	0.26	-0.01	(-1.40)	-0.22	(-2.62)**	0.14	0.97	0.64
Germany	1950	0.01	(1.48)	-0.10	(-1.13)	0.68	(5.55)**	0.47	0.00	(0.42)	-0.78	(-2.49)**	0.07	0.96	0.15
Italy	1950	-0.01	(-0.80)	-0.00	(-0.03)	0.59	(4.33)**	0.30	-0.02	(-1.05)	0.06	(0.33)	-0.02	1.00	0.66
Japan	1950	-0.02	(-5.49)**	0.13	(1.96)*	0.40	(2.96)**	0.57	-0.02	(-2.36)**	-1.25	(-4.67)**	0.29	0.97	0.51
Netherlands	1950	0.01	(0.44)	0.18	(2.30)**	0.68	(5.48)**	0.38	-0.04	(-1.82)*	-0.43	(-1.61)	0.10	0.98	0.71
Norway	1950	0.01	(0.56)	-0.06	(-0.59)	0.23	(1.89)*	0.02	-0.06	(-1.87)*	0.42	(1.34)	0.03	1.00	0.66
Spain	1950	0.02	(0.64)	-0.33	(-2.85)**	0.42	(3.07)**	0.17	-0.15	(-1.90)*	-0.38	(-0.57)	0.05	0.95	0.87
Sweden	1955	0.03	(3.21)**	-0.34	(-3.52)**	0.51	(3.74)**	0.31	-0.02	(-1.46)	0.47	(2.74)**	0.10	0.83	0.47
Switzerland	1950	0.00	(0.28)	-0.04	(-0.56)	0.67	(6.09)**	0.37	-0.01	(-1.39)	-0.11	(-0.83)	0.02	1.00	0.80
U.K.	1950	0.02	(1.87)*	0.13	(1.24)	0.47	(2.81)**	0.27	-0.01	(-0.39)	-0.21	(-0.92)	-0.01	0.98	0.62
U.S.A	1950	-0.00	(-0.02)	0.17	(2.06)**	0.35	(2.10)**	0.15	-0.00	(-0.95)	-0.08	(-0.89)	0.00	0.99	0.68
World	1950	-0.00	(-0.33)	0.27	(3.82)**	0.27	(2.10)**	0.23	-0.01	(-2.22)**	0.02	(0.23)	0.05	0.98	0.92
# of Expected Signs		13 (positive)		10 (negative)		18 (positive)			17 (negative)		9 (positive)				

results, their standard deviation of predicted values should be higher. The predicted x_t and σ_t^2 should represent fluctuating economic growth and economic uncertainty.

Table 4.8 shows the standard deviation comparison for the long-run component and the volatility component. The volatility component from the long-run sample regressions is 4.45 times higher on average than that from the short-run sample regressions, while the long-run component is 2.13 times higher. Thus, the predictive regressions in recovering consumption dynamics require longer time-series data in that fluctuating consumption volatility are better estimated. Our findings emphasize the role of the long time span data in measuring the persistent component in consumption and consumption volatility.[53] Barro (2006, 2009) argues that disaster risk is a major factor underlying asset pricing puzzles, and that long data sample is needed to capture such risk. Bansal and Yaron (2004) also highlight the issue that a long span of data provides small estimation errors on moments. We confirm that volatility risk in the LRR model should be predicted with the long-run data sample.

4.7 Integrated vs. Segmented Market

In this section, we provide results with the perfect market segmentation assumption with a long sample of data. Each country has its own consumption dynamics.

Table 4.9 Specification (1) shows that fewer than half of the countries in our sample carry the expected signs for the shocks. Thus, we confirm that the short-run and long-run shock have weakly associated with value premium as in Table 4.4. However, in the segmented market, value premiums are only associated with the expected volatility risk in 6 countries and the world. In Specification (2), the pricing

[53] We also test whether consumption data quality matters, using nondurables. We find that all coefficients in the regressions are significant for the U.S. and the entire world, which have long time span for nondurables.

Table 4.8: Standard Deviation of Extracted Components

This table shows the standard deviation of extracted long-run component and volatility component from predictive regressions in Table 4.3 and 4.8. In calculating the standard deviation of variables, only the period with both asset and macro data in the short-run sample are selected. For example, Australia has period from 1987 to 2008. During the period, assets and extracted components appear.

Country	Period	S.D. of Long-Run Component			S.D. of Volatility Component		
		Long-Run Sample (A)	Short-Run Sample (B)	(A)/(B)	Long-Run Sample (A)	Short-Run Sample (B)	(A)/(B)
Australia	1987-2008	1.30	0.34	3.83	9.68	1.03	9.38
Austria	1992-2008	0.50	0.52	0.96	1.94	1.00	1.94
Belgium	1987-2008	0.46	0.08	5.82	0.89	0.79	1.13
Canada	1981-2008	0.69	0.44	1.57	3.63	1.24	2.93
Denmark	1989-2008	0.36	0.11	3.13	4.85	0.85	5.68
Finland	1991-2008	0.61	0.67	0.91	5.48	1.82	3.02
France	1983-2008	0.89	0.37	2.41	8.18	0.58	14.00
Germany	1982-2008	0.54	0.51	1.06	2.90	1.19	2.43
Italy	1987-2008	1.04	0.29	3.52	2.33	0.59	3.93
Japan	1981-2008	0.09	0.98	0.09	6.53	2.16	3.03
Netherlands	1982-2008	0.84	0.28	3.04	10.17	1.02	10.00
Norway	1988-2008	0.29	0.26	1.12	1.10	1.90	0.58
Spain	1990-2008	0.94	0.29	3.22	10.24	1.90	5.39
Sweden	1983-2008	0.27	1.10	0.24	2.44	1.12	2.18
Switzerland	1982-2008	0.87	0.27	3.21	2.13	2.18	0.98
U.K.	1981-2008	0.70	0.56	1.25	1.42	0.37	3.80
U.S.A	1952-2008	0.65	0.31	2.07	1.36	0.23	5.91
World	1952-2008	0.58	0.60	0.97	1.73	0.45	3.87
Average		0.65	0.44	2.13	4.28	1.13	4.45

Table 4.9: LRR Betas and Cross-Section Regressions under the Market Segmentation

This table shows long-run betas and pricing-errors from cross-section regressions. Specification (1), LRR Betas and BM Portfolios, shows the short-run, long-run, and volatility betas of BM portfolios. Short-run beta is calculated as the covariance between the innovations in asset i returns and short-run risk divided by the variance of short-run risk. Long-run and volatility betas are calculated in the same way with respect to each risk. Low is the lowest BM portfolio and High is the highest BM portfolio. H-L indicates betas of High minus betas of Low. Specification (2), Cross-Sectional Regressions Comparison, shows the pricing errors from cross-sectional regressions of average returns in three asset pricing model: LRR Model is the long-run risk model, FF3 Model is Fama-French three-factor model, and CCAPM Model is the consumption-CAPM. Alpha is the constant in each regression meaning the pricing-errors. Numbers in parenthesis are t-statistics. "**" indicates t-statistics significant at 5% and "*" indicates t-statistics significant at 10%. The consumption dynamics for each country are recovered from the predictive regressions of the world in Table 4.3.

	Specification (1): LRR Betas and BM Portfolios									Specification (2): Cross-Sectional Regressions Comparison					
	Short-Run Betas			Long-Run Betas			Volatility Betas			LRR Model		FF3 Model		CCAPM Model	
	Low	High	H-L	Low	High	H-L	Low	High	H-L	alpha	Adj R^2	alpha	Adj R^2	alpha	Adj R^2
Australia	0.65	6.44	5.79	1.96	0.89	-1.07	-131	-68	63	0.10 (3.47)**	0.20	0.08 (1.66)	0.44	0.10 (11.52)**	0.22
Austria	-4.70	-7.41	-2.70	4.12	6.24	2.12	75	356	281	0.01 (0.40)	0.11	-0.01 (-0.23)	0.28	0.01 (0.24)	0.09
Belgium	7.59	2.12	-5.47	4.92	-2.06	-6.98	-1,662	-214	1,448	0.08 (4.18)**	0.01	0.08 (1.86)*	0.29	0.10 (7.97)**	-0.05
Canada	8.36	7.31	-1.05	7.28	5.81	-1.47	-134	-577	-443	0.03 (0.48)	0.25	-0.06 (-0.73)	0.66	0.18 (6.17)**	0.26
Denmark	1.98	4.49	2.50	0.03	-4.11	-4.15	-47	133	180	0.08 (6.13)**	0.56	0.03 (0.91)	0.59	0.07 (3.48)**	-0.02
Finland	5.89	-0.59	-6.47	19.58	5.90	-13.68	-1,178	-316	862	0.05 (2.08)*	0.42	-0.02 (-0.33)	0.68	0.08 (3.67)**	0.03
France	6.89	3.71	-3.18	2.74	2.02	-0.72	-207	-90	117	0.09 (2.52)**	0.51	0.02 (0.33)	0.59	0.08 (5.11)**	0.41
Germany	1.05	-1.87	-2.92	6.93	7.59	0.67	-973	-981	-7	0.08 (2.19)**	0.06	0.01 (0.10)	0.41	0.10 (14.82)**	0.09
Italy	1.83	5.79	3.96	2.82	2.35	-0.48	535	291	-244	0.02 (0.98)	0.14	-0.04 (-1.34)	0.42	0.02 (2.21)**	0.15
Japan	1.28	5.66	4.38	17.87	18.60	0.73	-103	-38	65	0.05 (0.97)	0.10	-0.04 (-0.61)	0.61	0.03 (1.47)	0.38
Netherlands	6.04	1.39	-4.64	3.71	4.60	0.89	-1	-130	-130	0.04 (1.48)	0.21	0.05 (1.13)	0.28	0.12 (12.45)**	0.25
Norway	0.20	-1.16	-1.36	5.93	7.23	1.30	-2,149	-2,695	-546	0.08 (7.22)**	0.57	-0.04 (-1.21)	0.77	0.09 (8.61)**	0.03
Spain	7.15	3.68	-3.47	3.33	2.04	-1.29	-127	-73	54	0.01 (0.36)	0.05	-0.05 (-0.66)	0.21	0.07 (5.97)**	-0.05
Sweden	8.68	3.69	-4.99	7.15	3.92	-3.23	-939	-1,172	-233	0.12 (2.97)**	0.28	-0.05 (-1.14)	0.43	0.18 (6.50)**	0.22
Switzerland	5.56	1.59	-3.97	4.01	3.06	-0.95	-381	-90	291	0.04 (3.07)**	0.67	0.02 (1.65)	0.78	0.09 (12.20)**	0.02
U.K.	1.59	8.14	6.55	3.41	0.01	-3.40	-34	380	414	0.07 (2.94)**	0.33	0.04 (0.96)	0.70	0.04 (4.24)**	0.48
U.S.A	2.25	3.57	1.32	8.17	12.02	3.85	-1,317	-2,234	-916	-0.03 (-2.59)**	0.90	0.03 (1.26)	0.97	0.10 (9.22)**	-0.01
World	2.75	4.49	1.74	7.62	11.08	3.46	-1,530	-2,540	-1,010	-0.01 (-0.54)	0.93	0.00 (0.12)	0.96	0.03 (2.16)**	0.60
# of Expected Signs	17	14	7	18	16	7	16	14	8						

errors are significant at the 10% level in 11 countries, while only 1 country has significant pricing errors in the FF3 model. The sample countries represent highly industrialized countries in the world which are more likely to be integrated. Hence, the market integration assumption is a better assumption than segmentation.

5. U.S. vs International Results

The main findings leave the question why the LRR framework has weak association to the value premium in international markets while we confirm Bansal, Kiku and Yaron (2007)'s findings that the LRR model explain the value premium in the U.S. We examine three possible issues. First, we may have sub-sample size biases in international return data. Second, the econometric methodology or consumption data in extracting long-run risks may need different specification. Finally, we relax the market integration/segmentation assumption.

5.1 The Sub-Sample Size of Returns

One main difference between the U.S. and international markets in the analysisis the sample size of returns. The long time-series of U.S. return series covering from 1930 to 2008 may be a reason why returns of value portfolio has higher exposure to long-run risk component than those of growth portfolio in the U.S. We calculate LRR betas with various return sample periods for the U.S. market and see if shorter return series provide the association. Table 4.10 Panel A compares the short-run, long-run and volatility betas from longer return series to shorter return series in the U.S. In long-run betas, the column, H-L, is the largest in the longest sample period. To examine the sample size issue further, we obtain another country's longer returns sample and see if it also supports the same theory. Thus, we obtain a longer U.K.

returns data used in Dimson, Nagel, and Quigley (2003).[54] They collect a long series of U.K. returns and form quartile BM portfolios and confirm that the value premium exists in their sample period available from 1955 to 2001. In Table 4.10, Panel B shows that in the U.K., even when we use the longer sample, long-run consumption beta of the value portfolio does not show the higher exposure to long-run risk component. The opposite results with the U.K. directly support that the sample size is not the main reason having the weak association in international market.

5.2 Varying Econometric Methodology and Consumption Data

We employ five variations in predicting state variables to see whether Bansal, Kiku and Yaron (2007)'s regression methodology provides robust and reliable long-run and volatility components. First, we redefine consumption growth rate with two-year average as it may measure long-term economic growth. Second, in predicted regressions, lag of consumption growth rate is added as an explanatory variable as Colacito and Croce (2009) find that adding the variable improves the regression results. Third, the innovation of returns is based on dividend growth rates instead of returns as the model is built on dividend growth dynamics. Fourth, to investigate the poor international consumption data quality, we use U.S. non-durable consumption data as a proxy for world consumption data. Finally, we use higher frequency data, quarterly data, using the U.S. quarterly consumption as a proxy for world consumption data. In all these robustness checks, we find that long-run risk component consistently has weak association and consumption volatility risk has association with the value premium in international markets.

[54] http://faculty-gsb.stanford.edu/nagel/datapapers.html

Table 4.10: LRR Betas and Sample Periods

This table shows LRR betas calculated based on various sample periods of returns in the U.S. and in the U.K. The U.S. return series is downloaded at Professor Kenneth French website and the U.K return series is obtained from data used in Dimson, Nagel, and Quigley (2003) at http://faculty-gsb.stanford.edu/nagel/datapapers.html. The U.K. return series is available from 1955 to 2001.

Panel A: The U.S.

Model	ISO	Period	Short-Run Risk Betas			Long-Run Risk Betas			Volatility Betas		
			Low	High	H-L	Low	High	H-L	Low	High	H-L
Integrated	USA	1930-2008	1.90	3.83	1.93	6.76	10.74	3.99	-1,277.97	-2,373.05	-1,095.08
	USA	1940-2008	1.62	3.65	2.03	7.49	9.23	1.74	-1,288.00	-2,028.33	-740.33
	USA	1950-2008	1.20	2.58	1.38	8.11	8.29	0.18	-1,288.23	-1,750.28	-462.05
	USA	1960-2008	2.45	4.36	1.92	7.74	7.40	-0.34	-1,163.71	-1,554.33	-390.61
	USA	1970-2008	3.74	5.89	2.15	8.24	7.45	-0.79	-1,210.96	-1,534.86	-323.90
	USA	1980-2008	3.75	8.09	4.33	6.68	7.25	0.57	-232.56	-1,651.09	-1,418.53
	USA	1990-2008	16.78	18.42	1.64	6.95	7.94	0.98	210.78	-1,485.55	-1,696.33
Segmented	USA	1930-2008	1.10	1.59	0.49	6.31	8.62	2.31	-661.24	-1,118.69	-457.45
	USA	1940-2008	0.01	0.66	0.65	8.11	9.56	1.45	-672.89	-921.52	-248.63
	USA	1950-2008	1.31	3.40	2.09	8.67	8.68	0.01	-1,259.96	-1,386.97	-127.01
	USA	1960-2008	2.02	5.24	3.22	9.09	8.35	-0.74	-1,196.01	-1,145.53	50.47
	USA	1970-2008	2.94	5.55	2.61	9.30	7.59	-1.71	-1,137.68	-912.97	224.71
	USA	1980-2008	1.34	5.27	3.92	9.05	7.37	-1.68	-909.09	-650.91	258.18
	USA	1990-2008	7.27	10.86	3.59	8.57	8.01	-0.56	-580.86	-913.55	-332.70

Panel B: The U.K.

Model	ISO	Period	Short-Run Risk Betas			Long-Run Risk Betas			Volatility Betas		
			Low	High	H-L	Low	High	H-L	Low	High	H-L
Integrated	GBR	1955-2001	10.02	9.85	-0.16	5.10	4.36	-0.74	-1,062.03	-1,037.47	24.55
	GBR	1960-2001	9.18	9.18	-0.01	5.49	4.64	-0.85	-1,132.18	-1,091.42	40.76
	GBR	1970-2001	11.57	11.94	0.37	5.00	4.03	-0.97	-1,033.39	-991.25	42.14
	GBR	1980-2001	10.86	10.34	-0.52	2.35	2.77	0.42	-472.07	-999.25	-527.18
Segmented	GBR	1955-2001	6.26	6.33	0.07	5.43	4.56	-0.87	-361.75	-309.01	52.74
	GBR	1960-2001	5.98	6.04	0.06	5.20	4.41	-0.79	-332.63	-289.93	42.70
	GBR	1970-2001	6.24	6.20	-0.04	6.27	5.21	-1.06	-394.49	-335.42	59.07
	GBR	1980-2001	3.74	3.50	-0.24	5.00	4.07	-0.93	-501.79	-510.40	-8.61

Table 4.11: LRR Betas and the Partial Market Integration Assumption

This table shows six LRR betas under the partial market integration assumption of growth (Low), value (High) portfolios and High minus Low betas (H-L). Local_orthogonal indicates pure domestic SR, LR and VOL betas, global indicates global SR, LR and VOL betas.

	Cg	Short-Run Risks Betas						Long-Run Risks Betas						Volatility Risks Betas					
		Local_Orthogonal			Global			Local_Orthogonal			Global			Local_Orthogonal			Global		
		Low	High	H-L	Low	High	H-L	Low	High	H-L	Low	High	H-L	Low	High	H-L	Low	High	H-L
AUS	1980-2008	-1.57	5.38	6.95	5.75	5.63	-0.11	9.40	4.88	-4.52	6.23	4.65	-1.58	-149.27	-92.22	57.05	-1,230.81	-851.38	379.43
AUT	1980-2008	-6.67	-10.69	-4.02	8.05	2.98	-5.07	6.00	7.87	1.87	2.67	3.84	1.17	192.71	519.51	326.80	-718.52	-1,233.07	-514.55
BEL	1980-2008	-0.60	-5.80	-5.20	13.66	8.39	-5.27	33.85	27.08	-6.77	7.25	2.53	-4.72	-1,669.34	-616.55	1,052.79	-1,547.00	-1,083.68	463.32
CAN	1980-2008	7.56	8.29	0.73	11.64	4.93	-6.70	9.89	-13.67	-23.56	9.95	8.08	-1.87	-1,645.80	700.33	2,346.13	-694.93	-1,956.68	-1,261.75
DNK	1980-2008	-1.85	1.62	3.47	11.31	7.72	-3.59	-22.01	-32.63	-10.63	7.77	6.36	-1.42	63.26	209.05	145.79	-1,095.56	-2,228.99	-1,133.43
FIN	1980-2008	-2.58	-4.14	-1.56	27.97	1.06	-26.91	12.44	27.71	15.27	21.33	7.30	-14.04	-1,330.04	-144.47	1,185.57	4,172.05	-727.76	-4,899.81
FRA	1980-2008	-5.81	-9.09	-3.29	10.91	13.74	2.83	31.46	24.75	-6.72	8.76	5.98	-2.79	-37.16	24.11	61.27	-1,049.45	-1,138.29	-88.84
DEU	1980-2008	-3.01	-5.11	-2.10	11.01	7.70	-3.31	33.83	44.22	10.39	6.97	5.07	-1.90	-941.44	-420.75	520.69	-973.65	-1,507.22	-533.57
ITA	1980-2008	-0.40	4.07	4.48	10.26	14.74	4.48	20.45	14.98	-5.48	6.74	7.16	0.43	678.30	491.29	-187.01	-717.60	-1,126.62	-409.02
JPN	1980-2008	0.89	2.78	1.89	10.07	8.80	-1.28	12.41	13.85	1.45	5.98	3.61	-2.37	-5.92	37.63	43.55	-485.03	-1,112.45	-627.43
NLD	1980-2008	6.37	4.75	-1.62	10.51	15.66	5.15	-14.78	0.39	15.17	7.55	7.09	-0.46	11.98	5.87	-6.11	-992.31	-2,412.13	-1,419.82
NOR	1980-2008	-0.90	-2.30	-1.40	15.56	11.50	-4.06	191.20	255.64	64.44	11.17	13.94	2.78	-1,255.58	-1,386.76	-131.18	-1,695.18	-2,540.26	-845.07
ESP	1980-2008	-2.91	-1.29	1.62	10.23	0.11	-10.12	19.52	10.31	-9.21	7.78	7.15	-0.63	96.18	62.15	-34.03	-1,710.22	-1,519.32	190.90
SWE	1980-2008	3.04	-4.50	-7.54	11.26	7.95	-3.30	-7.13	-26.19	-19.06	13.33	10.49	-2.84	-542.46	-305.70	236.76	-1,038.66	-2,523.33	-1,484.67
CHE	1980-2008	-2.45	-9.51	-7.06	8.29	6.74	-1.55	1.11	3.10	1.99	5.73	4.86	-0.87	7.65	59.19	51.54	-1,201.79	-1,287.41	-85.63
GBR	1980-2008	-1.47	6.79	8.26	3.78	8.72	4.94	-0.63	-0.43	0.20	6.63	4.49	-2.14	-81.86	79.89	161.75	-525.76	-319.94	205.82
USA	1980-2008	-2.09	7.29	9.38	2.76	8.13	5.37	24.97	1.47	-23.49	6.94	7.24	0.30	-517.30	275.83	793.12	-249.70	-1,650.30	-1,400.60
WLD	1980-2008				6.57	9.49	2.92				7.19	6.29	-0.90				-646.59	-1,432.74	-786.15
# of	Exp. Signs	4	8	8	18	18	6	13	13	8	18	18	4	11	6	4	17	18	14

5.3 Relaxing the Market Integration and Segmentation Assumptions

In international markets, the assumptions about the perfect market integration and segmentation could be too extreme. Thus, we adopt the partial market integration assumption that the long-run component is decomposed into the domestic and the global long-run components: the domestic expected economic growth and the world expected economic growth. Under this assumption, we get six LRR components: one set of domestic short-run, long-run and volatility; the other set of global components. Empirically, domestic long-run component under the market segmentation assumption includes global long-run component. Thus, we get the pure domestic component by regressing the domestic component under the perfect market segmentation assumption on the global component under the perfect market integration assumption. Table 4.11 shows that, in H-L column of long-run beta section, 9 countries have positive signs in either pure domestic beta or global beta, which is higher than 6 countries under the perfect market integration in Table 4.6. In volatility beta section, H-L column shows negative signs in 14 countries as the same as in Table 4.6. The partial market integration assumption gives us higher number of countries where long-run component is related to the value premium. However, it does not provide significant improvement. Thus, the two extreme market integration assumptions do not significantly affect our main findings.

Overall, this section shows that international value premium cannot be explained by long run risk, though volatility risk can explain part of the value premium in international markets.

6. Conclusion

This paper provides international evidence for the LRR model in explaining the value premium. We empirically show that the LRR model produces higher implied returns of value portfolio in 10 markets under the market integration assumption. In particular, the international value premium is associated with global expected consumption volatility (or global economic uncertainty) for those markets. We find no evidence that short-run or long-run risks on consumption growth are related to the value premium outside of the U.S. market. Thus, the implied value premium, according to the model, shows that value stocks are riskier when the global economic uncertainty rises.

In measuring expected volatility risk, we show that a long sample of data provides more fluctuation in predicted long-run and volatility components. The expected volatility risk with higher fluctuation from a long sample of data shows better performance in explaining the value premium than that from a short-run, post-war sample. This finding is related to Barro's argument that disaster risks may affect asset prices.

Overall, we provide economic explanations from the LRR framework for the empirical regularity of the value premium outside of the U.S. market. However, the value premium is not fully captured by the expected economic growth or the expected economic uncertainty which may also allow room for alternative explanations.

APPENDIX 3

A.1: The Innovations to the Log IMRS

With solution coefficients, the innovations of the log of the consumption growth rate, and the log of returns on aggregate portfolio into the Euler equation, the IMRS is

$$m_{t+1} = \Gamma_0 + \Gamma_1 x_t + \Gamma_2 \sigma_t^2 - \lambda_\eta \sigma_t \eta_{t+1} - \lambda_e \sigma_t e_{t+1} - \lambda_w \sigma_t w_{t+1} \tag{20}$$

where

$$\Gamma_0 = log\delta - \frac{1}{\psi}\mu_c - 0.5\theta(\theta 1)(\kappa_1 A_2 \sigma_w)^2$$
$$\Gamma_1 = -\frac{1}{\psi}$$
$$\Gamma_2 = (\theta - 1)(\kappa_1 \nu - 1)A_2$$
$$\lambda_\eta = \gamma$$
$$\lambda_e = (1-\theta)\kappa_1 A_1 \varphi_e = (\gamma - \frac{1}{\psi})\frac{\kappa_1 \varphi_e}{1-\kappa_1 \rho}$$
$$\lambda_w = (1-\theta)\kappa_1 A_2 = -(\gamma - 1)(\gamma - \frac{1}{\psi})\frac{0.5\kappa_1}{1-\kappa_1 \nu}\left[1 + \left(\frac{\kappa_1 \varphi_2}{1-\kappa_1 \rho}\right)^2\right]$$

In an annual model, the log of price to consumption ratio follows the process, $z_t = A_0 + A_1 x_t + A_2 \sigma_t^2 + A_3 \sigma_{t-1} \eta_t$. Then, the log of the IMRS in an annual model can be expressed as

$$m_{t+1} = \Gamma_0 + \Gamma_1 x_t + \Gamma_2 \sigma_t^2 + \Gamma_3 \sigma_{t-1} \eta_t - \lambda_\eta \sigma_t \eta_{t+1} - \lambda_e \sigma_t e_{t+1} - \lambda_w \sigma_t w_{t+1} \tag{21}$$

For both monthly and annual models, the innovation to m_{t+1} is

$$m_{t+1} - E_t(m_{t+1}) = -\lambda_\eta \sigma_t \eta_{t+1} - \lambda_e \sigma_t e_{t+1} - \lambda_w \sigma_t w_{t+1} \tag{22}$$

λ's represent the market price of risk for each source of risk, η_{t+1}, e_{t+1}, and w_{t+1}.

A.2: The Innovation to Asset Returns

Using the standard Campbell and Shiller (1988) return approximation, $r_{i,t+1}$ equals $r_{i,t+1} = \kappa_{0,i} + \kappa_{1,i} z_{i,t+1} - z_{i,t} + d_{i,t+1}$ where $z_{i,t} = \log \frac{P_{i,t+1}}{D_{i,t}}$. Bansal and Yaron (2004) conjecture that $z_{i,t} = A_{0,i} + A_{1,i} x_t + A_{2,i} \sigma_t^2$ and solve for $z_{i,t}$.

$$A_{1,i} = \frac{\phi_{d,i} - \frac{1}{\psi}}{1 - \kappa_{1,i}\rho}$$
$$A_{2,i} = \frac{1}{1-\kappa_{1,i}\nu}\left[\Gamma_2 + \frac{1}{2}\left(\varphi_{d,i}^2 + (\pi_{d,i} - \lambda_\eta)^2 + (\kappa_{1,i} A_{1,i} \varphi_e)^2\right)\right] \tag{23}$$

The innovation of the asset i return is,

$$r_{i,t+1} - E_t[r_{i,t+1}] = \varphi_{d,i}\sigma_t \mu_{i,t+1} + \beta_{\eta,i}\sigma_t \eta_{t+1} + \beta_{e,i}\sigma_t e_{t+1} + \beta_{w,i}\sigma_w w_{t+1} \tag{24}$$

where betas are defined as, $\beta_{\eta,i} = \pi_{d,i}$, $\beta_{e,i} = \kappa_{1,i} A_{1,i} \varphi_e$, and $\beta_{w,i} = \kappa_{1,i} A_{2,i}$.

A.3: International Consumption and Aggregate Economic Data

Barro and Ursúa's (2008) data is the most comprehensive and longest consumption data series. For post-War period, we have compared their data with other consumption data from various sources: Campbell (2003), International Monetary Fund (IMF), World Bank, Global Insight, Datastream, GFD, and Penn World Table 6.3.[55] We confirm that their data is similar to other international consumption data for post-War period. For pre-War period, comparable sources to Barro and Ursúa dataset are not available. Thus, we obtain historical real GDP growth rates from GFD and proceed the same analysis as a robust test. Barro, Nakamura, Steinsson, and Ursúa (2009) estimate an empirical consumption disasters asset pricing model using Barro and Ursúa's data. We calculate inflation rates as the log differences of CPI, and the real interest rate as long-term interest rates minus inflation rates

[55] Some sources do not provide clear explanation how to treat Germany reunification. Barro and Ursúa (2008) carefully explain their treatment for border changes.

GFD compiled by Bryan Taylor covers more than 200 countries extending back to 1265. The database has been used in Goetzmann, Li, and Rouwenhorst (2005), Lewis and Liu (2009) and other papers. Goetzmann, Li, and Rouwenhorst (2005) have verified the quality of GFD with many manual data checks and found that it was accurate. The one problem that Goetzmann, Li, and Rouwenhorst (2005) mention is that the quality of dividend yield series before 1920's is often problematic. We conduct analyses using individual country's dividend yield series and the reported world dividend series and compare if there is any impact from that portion of dividend yield data. We find that the results are similar.

APPENDIX 4

Table A4.1: Consumption Data Source

This table shows the data source for consumption for each country and the analysis period for the predictive regressions.

Consumption Growth	Country	Analysis Period	Data Source
Real total private consumption per capita	Australia	1902-2008	Barro and Ursúa (2008) index until 2006 Penn World Table 6.3 for 2007 Real GDP growth rates from GFD for 2008
	Austria	1925-2008	
	Belgium	1927-2008	
	Canada	1925-2008	
	Denmark	1925-2008	
	Finland	1925-2008	
	France	1931-2008	
	Germany	1924-2008	
	Italy	1925-2008	
	Japan	1886-2008	
	Netherlands	1925-2008	
	Norway	1925-2008	
	Spain	1925-2008	
	Sweden	1925-2008	
	Switzerland	1925-2008	
	U.K.	1933-2008	
	U.S.A	1930-2008	Barro and Ursúa (2008) index until 1929, Bureau of Economic Analysis from 1930 to 2008
	World	1925-2008	weighted average of 17 countries using real GDP
Real nondurable goods and services on consumption per capita	Canada	1962-2008	Carroll, Slacalek, and Sommer (2009) until 2006 Penn World Table 6.3 for 2007 Real GDP growth rates from GFD for 2008
	France	1971-2008	
	Germany	1979-2008	
	Italy	1965-2008	
	Japan	1982-2008	
	U.K.	1971-2008	
	U.S.A	1930-2008	Bureau of Economic Analysis
	World	1930-2008	weighted average of G7 countries using real GDP

Table A4.2: Summary Statistics of Nodurables from 1930 to 2008

This table reports summary statistics of nondurables growth rates from 1930 to 2008. Panel A reports average of consumption growth rates for each decade. The growth rates is log differences of real nondurables per capita. The numbers are in percentage. Panel B shows the standard deviation for each decade. World consumption growth rates are weighted average for G7 countries. Real US GDP is used as a country weight. Panel C shows the percentage of country weight. Real US GDP is collected from Global Financial Data and Barro and Ursúa (2009) data. Each column indicate decade. For example, 1930 column is the period from 1930 to 1939. 1930 includes the Great Depression event, and 1940 includes World War II event.

Panel A: Mean of Nondurables Growth in Each Decade

Country	1930	1940	1950	1960	1970	1980	1990	2000
Canada	-	-	-	2.0	2.3	1.3	0.9	2.0
France	-	-	-	-	1.7	1.6	1.1	1.4
Germany	-	-	-	-	3.3	1.9	2.2	0.6
Italy	-	-	-	-	-	2.3	1.6	0.6
Japan	-	-	-	-	3.8	2.2	1.3	0.2
U.K.	-	-	-	1.4	2.2	2.6	1.4	1.8
U.S.A	0.3	2.5	2.0	2.8	2.3	2.1	1.6	1.6
World	0.3	2.5	2.0	2.6	2.7	2.1	1.6	1.2

Panel B: Standard deviation in each decade for G7 country

Country	1930	1940	1950	1960	1970	1980	1990	2000
Canada	-	-	-	0.5	1.1	1.5	1.3	1.3
France	-	-	-	-	-	0.4	0.9	0.8
Germany	-	-	-	-	1.5	1.0	1.9	1.1
Italy	-	-	-	-	-	1.0	1.0	1.1
Japan	-	-	-	-	2.4	1.1	1.1	0.7
U.K.	-	-	-	0.9	1.9	2.2	1.5	1.0
U.S.A	4.9	2.2	0.8	1.1	1.2	1.3	0.9	1.0
World	4.9	2.2	0.8	0.9	1.2	1.0	0.5	0.7

Panel C: Real GDP weight in each decade for G7 country

Country	1930	1940	1950	1960	1970	1980	1990	2000
Canada	-	-	-	6.2	4.4	4.1	3.9	4.3
France	-	-	-	-	8.5	8.8	8.3	8.2
Germany	-	-	-	-	14.3	12.5	12.0	11.2
Italy	-	-	-	-	-	7.2	7.2	7.0
Japan	-	-	-	-	16.6	17.1	17.7	15.8
U.K.	-	-	-	16.7	10.8	8.8	8.4	8.8
U.S.A	100	100	100	77.1	45.5	41.6	42.5	44.8
World	100	100	100	100	100	100	100	100

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CHAPTER 5

CONCLUSION

The return predictability of valuation ratios such as Book-to-Market ratio has been long studied since Fama and French (1992, 1993). However, it has been a puzzle in financial economics why the value premium exists across countries and within countries. In this dissertation, I provide empirical evidence based on theoretical framework over 33 countries including both developed and emerging market countries. I find that fundamental firm risk factors, industrial factor and country risk factors explain cross-sectional differences in price multiples and those risk factors are related to stock return predictability of price multiples. Under the recent theoretical framework, long-run risks also explain the value premium. The model has built a theoretical explanation and has provided positive empirical evidence regarding international value premium. However, the extent to which the model replicates the realized value premium is a small portion. Given a short sample period of international return data and econometric analysis requiring long sample of returns, it is a limited success to directly present that value premium is related to long-run risks internationally. In my future research, I plan to overcome the issue by focusing on whether long-run risks model can explain international price multiples.